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JOURNAL OF DENTAL MEDICINE

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THE INTRADERMAL ASCORBIC ACID TEST PART IV. A STUDY OF TOLERANCE TESTING IN SIXTEEN DENTAL STUDENTS*

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INTRODUCTION

It was noted in an earlier report[1] that disease begins far in advance of its clinical expression. In other words, long before there are symptoms and signs of disease, the pathologic process is already operating at the cellular level. Thus, the continuing problem of clinical investigation is to discover criteria and invent methods for the earliest possible recognition of the disease process.

It is generally accepted that tolerance testing is a more sensitive index of disease than single determinations and procedures. The basis for this belief and an analysis of tolerance testing in sixteen presumably healthy dental students will constitute the justification of this report.

THEORY OF TOLERANCE TESTING

In order to develop the ideas which suggest that tolerance testing is a useful clinical method it is necessary, first of all, to define the term in clinical language. Secondly, it will be informative to trace the evolution of ideas which find expression in the survival of this tool in clinical practice. Lastly, an appreciation of tolerance testing will be enhanced by considering its proper place in relationship to other laboratory procedures presently in use for the evaluation of disease.

DEFINITION

The dictionary defines *tolerance* as the *ability to endure*. This implies that something is done to a subject, that the response to that something is measured and that this measurable response is definitive of endurance. This is obviously a *functional* approach to health and disease. The assumption is that whatever a body does with an administered substance or how it reacts to a measured stress is the desirable reaction. It is further assumed that one can learn whether a body needs or does not need a substance by observing what happens to that substance following its administration. A classic example of such a procedure is the glucose tolerance test which has stood the test of time and trial and has proved its diagnostic worth. It is doubtless realized that single blood glucose readings will not reveal the ability to endure (metabolize) and that, after all, this ability should be more designative of health or disease than a simple face-value determination.

A man may appear to be strong and healthy. The real test of his health, however, is in subjecting him to controlled stress and allowing the observed (ability to endure) to represent his true state of health. Operationally, tolerance testing may be summed up as a diagnostic method which calls for the controlled introduction of material into a body in order to infer from the quantitated response the status of

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that organism with regard to that particular stressor substance.

TOLERANCE TESTING AS THE EMBODIMENT OF AN EARLY IDEA

Man has oftimes looked to nature for the solution of his problems. Man's creativeness has, in many respects, overridden nature. Yet, it is not uncommon that the solution to a problem has its first roots in observations of existing, sometimes very obvious, natural phenomena. For example, if one wishes to grow banana trees, one must study the conditions under which banana trees grow—soil analysis, temperature, sunshine, etc. These conditions are considered to be the provisions of nature which man must successfully mimic. This attitude of recognizing wisdom in nature has factored heavily not only in the emergence of the teleologic consciousness of religions but in science as well. Evolutionists envisage man as a product of an inexorable process from lower forms and even inanimate structures. A belief in design is implicit in this doctrine. The upshot in this mode of thinking is that man sees patterns of activity and placement in the world about him as expressive of the wisdom of nature. "Nature does nothing in vain . . ." and it is indeed man's fortunate lot to discover how nature works.

It is an easy transition to a belief in the wisdom of the body. The *milieu interieur* of Claude Bernard exhibits clear overtones of purpose. The extension of the homeostatic theory by Walter Cannon envisages design as a primal force of bodily economy. Thus, systems exist which serve to maintain various bodily processes constant—temperature, fluid, pulse. Homeostasis, adaption to stress, nutritional balance, and tolerance testing all derive from this faith in the *wisdom of the body* and man's ability to observe and apply this *wisdom*.

There is no *a priori* reason why this type of approach should work. But the fact of the matter is, it has worked. There has accumulated a great deal of evidence that humans and lower animal forms, where free selection of diet is made possible, tend to choose food items which the body needs. For example, Bellows[2] demonstrated very well a quantitative relationship between thirst and tissue need in dogs. Davis[3] reported in great detail the successful growth of newly-weaned infants on self-selected diets. Richter and Eckert[4] were able to show, rather conclusively, that rats with an artificially increased calcium need, consistently preferred calcium-high foods.

The concept of homeostasis has led to many world-shaking discoveries while, currently, the adaptation theory is a guiding principle of great investigative promise. In respect of these evidences, it appears that the concept of bodily wisdom is at least pragmatically true.

RELATIONSHIP OF TOLERANCE TESTING TO OTHER LABORATORY TESTS

Laboratory test procedures may take the form of *as-is* determinations, single or multiple, or *tolerance* testing. To understand the practice of these two approaches, it is well to appreciate the elements of the disease theory which each does or does not satisfy. Since disease is defined as deviation from health, it becomes necessary to outline laboratory concepts of health. This has more than just academic importance because a concept of normalcy is the base from which the existence and extent of disease is deduced. It is convenient to generalize *three* operational approaches to normality: (1) averages of presumably healthy people, (2) averages of persons with optimal function or status of some measurable criterion, and (3) individual patterns.

Survey of Healthy Subjects: To ascertain a normal level of ascorbic acid in the blood plasma, one might choose to determine the plasma ascorbic acid values in a group of presumably healthy persons. *Normal* would then be defined as the range of scores between two standard deviations on both sides of the mean for the group. Persons with values outside of this range would be considered *deviates*.

Specific Criteria: Many studies are directed toward finding test values which are associated with optimal health of some specific criterion. For example, one might define plasma ascorbic acid level normality as the average score of persons with no obvious gingivitis, who imbibe

large quantities of citrus juices, or who show no roentgenographic evidence of disease. Deviates in this case would be plasma ascorbic acid scores beyond two standard deviations of the mean of the select group without, for example, gingivitis.

Individual Patterns: There is a large school of investigators who hold that *group* normality patterns are not sufficiently definitive of *individual* health. It is felt by these researchers that every person is unique. Therefore, one must study the individual as his own control. For example, these authorities would frown on a study of a single blood sugar value sample in one individual compared with a set of scores derived from single determinations of a group. These investigators prefer to subject the patient to change (tolerance) and to gauge the response to a load dose of glucose. It is felt that, how the body handles the additional glucose load, is more informative than a single glucose reading.

Actually, these *three* approaches to normality may be reduced to *two* categories so far as clinical diagnosis of an individual subject is concerned. The clinician can choose *group* ranges or *individual* patterns as the base from which to judge the presence or absence of disease. The choice, as has already been suggested, has more than academic import. After all, therapy follows from the choice. If one agrees that *group* values represent normal, then a single determination will suffice to place a patient in relation to the group and to arrange therapy such that the patient will meet the group normal range. If, on the other hand, the clinician feels that health and disease are *individual* problems, he will not be satisfied to accept a single reading as an indicator of the patient's status. The examiner will wish to perform a tolerance test or even go one step farther and observe response to therapy as a barometer of need. Be that as it may, it is here, within the concept of individuality, that tolerance testing functions.

The preceding account has summed up the general concept of normality with regard to the recognition of individual ills. The individual approach will now be enlarged upon by a consideration of the current theories of variation.

Intraindividual variation is quite as well established as fluctuation among different persons. In other words, people differ not only from one another but, from moment to moment, their own processes waver. At the same time, people and their own special processes maintain an overall pattern. A person's habits or bodily functions, if viewed temporally, would reveal a tendency toward constancy—a constancy akin to the centering tendency inferred from population frequency distributions. For example, blood pressure, temperature, eating habits, plasma ascorbic acid values vary periodically. If frequency charts were made available for each of these experiences, one could calculate the average and accept the range between one standard deviation in each direction from the mean as a measure of the dominant weight of the experience. If this account is accepted, it is easy to see that, at any one moment, a specific measurement on a person will more than likely fall within his usual habit (defined previously as the range between one standard deviation in each direction of the mean). In terms of quantitative likelihood, it can be said that, at any one moment, there is a 68 percent chance that the obtained score will fall within the range of one standard deviation. A particular subject may, for example, have an average daily ascorbic acid intake of 75 mg. and a standard deviation of 30 mg. This would mean that, on two successive days, 68 chances out of 100 the plasma ascorbic acid level would be within a range equivalent to the intake of 75 $\pm$ 30 mg. or between 45 and 105 mg. ascorbic acid. It also means that 32 percent of the time the intake will be 0 to 44 and 106 to 200 mg. ascorbic acid daily intake. The spread from 0 to 200 mg. is the complete dietary ascorbic acid range for this particular person. One could easily figure the odds that the patient's dietary level would be 0 or 200 mg.—perhaps the chances are 1 in 10,000. If one were of the single-determination-school, it is easy to see that, most of the time, he would have reliable estimates of the patient's usual daily dietary intake. At the same time, however, there is the possibility that the

subject will be caught "in the edge of his curve," so to speak. In the illustration just cited the patient may happen to be studied the day he consumes no ascorbic acid. The usual intake for this patient, it should be recalled, is 75 mg. Another person may be studied the day he imbibes 5 mg. of ascorbic acid which is obviously a small amount. It may conceivably be that the second individual's customary intake is only 5 mg. per day. In the first instance, the daily intake which is low is *unusual*. In the second case it is also low but *usual*. If the wisdom of the body has any application, it should aid here in distinguishing between the specious and the true value. If tolerance testing were done on these two patients—that is, the administration of a large dose of the vitamin to each—one of the subjects should retain more of the vitamin than the other. This, of course, follows from the concept of bodily wisdom that the one who needs the most will retain the most. In the example just outlined, it is reasonable to think that the person accustomed to a 75 mg. daily intake of ascorbic acid would require less of the vitamin than the subject who regularly ingests only 5 mg. daily.

In summary, it can be said that single determinations will more than likely yield reliable estimates. However, tolerance testing should, if bodily wisdom is operating, be more sensitive of the main weight of the habit, and therefore of patient need. When studying group status, single performances are adequate because of the centering tendency of randomly selected data. But in the study of the individual, either multiple determinations or tolerance testing should provide a more representative score.

Although the preceding account is very much oversimplified, it should aid in an appreciation

Figure 1

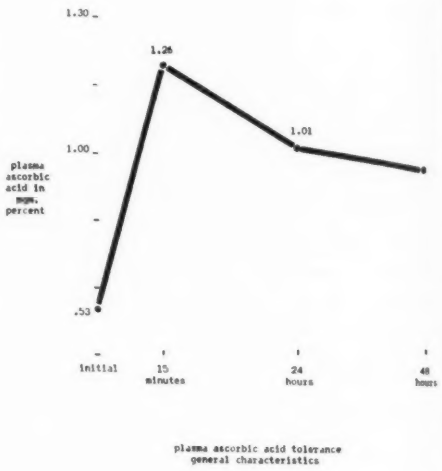


TABLE 1

PLASMA ASCORBIC ACID TOLERANCE — (GENERAL CHARACTERISTICS)

Characteristic	*Initial*	*Postinjection* 15 mins.	24 hrs.	48 hrs.
Mean (mg. percent)	.53	1.26	1.01	.95
Standard deviation (mg. percent)	.34	.14	.28	.37
Coefficient of variation*	64	11	28	37

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (mg. percent)	.73	.25	.06	.42
Standard error of difference	.092	.078	.112	.122
Observed t value	7.935	3.205	.536	3.443
Degree of freedom	14	14	14	14
P	< .001	< .005	.5	< .005

* standard deviation divided by mean

of the emergence of the idea of tolerance testing. Furthermore, the concept of individual variational patterns should yield some mathematic basis for skepticism of face-value measurements in individual subjects. Finally, the foregoing account should create awareness that tolerance concepts may aid in gaining reliable information.

ANALYSIS OF SIXTEEN DENTAL STUDENTS SUBJECTED TO TOLERANCE TESTING

METHOD OF INVESTIGATION

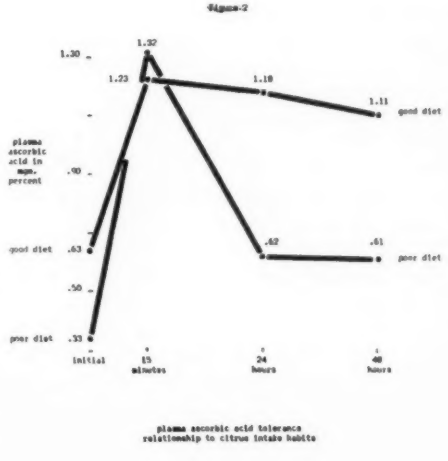
Plasma ascorbic acid levels and intradermal decolorization test times were performed simultaneously in sixteen dental students. Plasma determinations followed the methods of Mindlin and Butler.[5] The procedure for the intradermal test was that recommended by Slobody.[6] Immediately following these determinations, one gram of ascorbic acid was administered intravenously to each of the students. The plasma ascorbic acid and intradermal time values were then redetermined fifteen minutes after the intravenous injection, and again at 24 and 48 hours postinjection. In addition, a history of smoking habits and dietary intake of citrus fruit juices was acquired. A dietary intake of three or less 6-ounce glasses per week of citrus juice or its equivalent was considered a *poor* citrus intake. A diet containing more than three 6-ounce glasses per week or its equivalent was accepted as a *good* citrus intake. The obvious role of citrus intake in the ascorbic acid status of man justified the dietary history. Smoking habits were recorded because of reports in the literature[7, 8, 9] which suggest that tobacco consumption alters the ascorbic acid concentration in the tissues.

RESULTS

The data will be analyzed in terms of: (1) plasma ascorbic acid tolerance, (2) intradermal time tolerance, and (3) comparison of the plasma and intradermal tolerance tests.

Plasma Ascorbic Acid Tolerance Analysis: The plasma ascorbic acid tolerance results will be conveniently presented first as a general reaction of the students and then as group-specific responses. Thus, general characteristics of the test will first be considered. Then subgroup analysis will exhibit the relationship of the test to tobacco consumption and citrus intake habits. Finally, the tolerance pattern will be contrasted to the initial (pretolerance) scores as a way of suggesting whether tolerance testing has yielded more critical information.

General Characteristics: Figure 1 represents the 48 hour tolerance response of the sixteen dental students. It is of interest to know whether the sequential changes of the mean group plasma level, following load-dosing, are significant. Table 1 lists the statistical elements of the curve shown in Figure 1. It can be seen that the mean plasma ascorbic acid rise from an initial pretolerance value of .53 to 1.26 mg. percent 15 minutes postinjection is real. In other words, these two groups (preinjection versus postinjection) differ significantly from each other ($P < .001$). The descent from 1.26 to 1.01 mg. percent was also real ($P < .005$). The ostensible fall from 1.01 to .95 mg. percent from 24 to 48 hours was statistically insignificant as shown by a $P = .5$. That the 48 hour level was significantly higher than the initial score is also clear in Table 1 ($P < .005$). Thus, the group response to ascorbic acid loading, as visualized in plasma changes in a group of presumably healthy young people,



plasma ascorbic acid tolerance relationship to citrus intake habits

TABLE 2

PLASMA ASCORBIC ACID TOLERANCE — RELATION TO CITRUS DIET

Good Diet				
		Postinjection		
Characteristic	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Mean (mg. percent)	.63	1.23	1.18	1.11
Standard deviation (mg. percent)	.27	.14	.15	.25
Coefficient of variation	36	12	13	23

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (mg. percent)	.60	.05	.07	.48
Standard error if difference	.10	.06	.09	.12
Observed t value	6.316	.781	.769	4.174
P	$< .001$	$> .4$	$> .4$	$< .001$

Poor Diet				
		Postinjection		
Characteristic	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Mean (mg. percent)	.33	1.32	.62	.61
Standard deviation (mg. percent)	.40	.13	.35	.29
Coefficient of variation	123	10	57	47

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (mg. percent)	.99	.70	.01	.28
Standard error of difference	.19	.17	.20	.22
Observed t value	5.156	4.167	.049	1.256
P	$< .001$	$< .005$	$= .5$	$> .2$

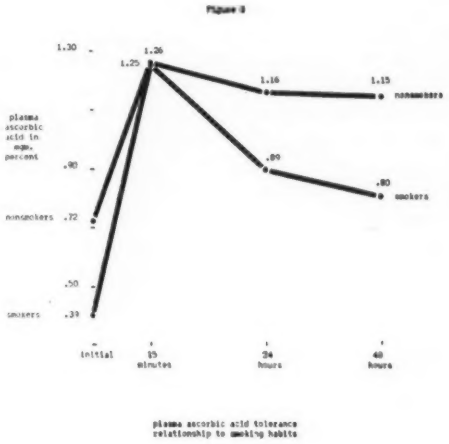
is a pronounced initial rise 15 minutes after an intravenous injection of 1 gram of ascorbic acid, a slight decrease at 24 hours and no appreciable change at 48 hours. However, the 48 hour plasma ascorbic acid concentration remains above the initial pretolerance level.

Another method of evaluating group homogeneity is to examine the coefficients of variation. The lower the coefficient of variation, the greater the central tendency of the individual subjects. Put another way, the lower the coefficient of variation, the more the individual subjects tend to be alike with respect to plasma ascorbic acid level. Table 1 shows that variation is greatest initially as evidenced by a coefficient of variation of 64. In other words, the subjects at this time are more unlike each other than at any other time during the experiment. Variation is least 15 minutes after the intravenous injection of 1 gm. of ascorbic acid. The intersubject variation is intermediate at 24 and 48 hours. Interestingly enough, the trend seems to be for greater variation as shown by a coefficient of variation at 24 hours of 28 and a greater coefficient (37) at 48 hours. The degree of similarity of subjects is striking at 15 minutes. It is as if a limit is being approached—a point toward which all of the subjects converge. It is pertinent, in this respect, that evidence has been presented[10] which suggests a plasma ascorbic acid-renal threshold of approximately 1.40 mg. percent. At 15 minutes the subjects clustered about a group mean of 1.26 mg. percent revealing a relatively short range of values from 1.00 to 1.50 mg. percent.

Relationship to Smoking and Citrus Intake Habits: It was noted earlier in this report that tobacco consumption and citrus intake histories

were recorded. In order to understand whether these two factors affected tolerance response, the dental students were formed into two groups based upon whether or not they smoked, partook well or poorly of citrus fruits and whether they described combined habits—good citrus intake-nonsmoker group versus poor citrus intake-smoker group. By plotting tolerance curves for each of these subgroups, one may visualize the effect of these factors upon both the initial and tolerance values.

Citrus Intake: Figure 2 shows the divergent plasma responses of persons with good versus poor citrus intake habits. Table 2 lists the statistical characteristics of these two subgroups. The tolerance pattern of the good diet group is one of an elevation in plasma ascorbic acid level at 15 minutes and a continued elevated level at both 24 and 48 hours. In contrast, those on a poor citrus diet show a pronounced decrease at 24 and 48 hours. The reduction in plasma level brings the 48 hour level to a point not significantly different from the initial concentration.



plasma ascorbic acid tolerance relationship to smoking habits

TABLE 3

PLASMA ASCORBIC ACID TOLERANCE — RELATION TO SMOKING

Nonsmokers

Characteristic	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Mean (mg. percent)	.72	1.25	1.16	1.15
Standard deviation (mg. percent)	.34	.14	.22	.27
Coefficient of variation	48	11	19	23

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (mg. percent)	.53	.09	.01	.43
Standard error of difference	.14	.09	.13	.16
Observed t value	3.800	.922	.076	2.627
P	$< .005$	$> .2$	$= .5$	$< .025$

Smokers

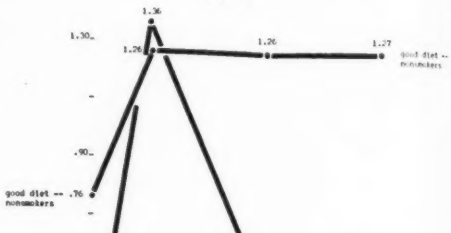
Characteristic	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Mean (mg. percent)	.39	1.26	.89	.80
Standard deviation (mg. percent)	.27	.15	.39	.34
Coefficient of variation	69	12	44	43

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (mg. percent)	.87	.37	.09	.41
Standard error of difference	.10	.14	.17	.14
Observed t value	8.450	2.657	.529	2.885
P	$<.001$	$<.025$	$=.5$	$<.025$

It is interesting that the plasma level of both groups tends to be similar at 15 minutes postinjection. At no other point is this likeness in evidence. This is further suggestive that some limit, common to both groups, is being approached. Again, it is noteworthy from Table 2, that group variability is less at 48 hours than initially in both subgroups.

Smoking Habits: Figure 3 and Table 3 summarize the comparative response of smokers and nonsmokers. The nonsmoker group plasma level rises at 15 minutes postinjection and remains elevated at 24 and 48 hours. In contrast, the smokers demonstrate a sharp 15 minute postinjection rise but a decline at 24 hours which remains relatively unchanged at 48 hours. Nevertheless, the 48 hour level of the smoker group is still above the initial value. The 15 minute scores of both groups are almost identical.

Figure 4



plasma ascorbic acid tolerance
relationship to combined smoking and citrus intake habits

TABLE 4

PLASMA ASCORBIC ACID TOLERANCE — RELATION TO COMBINED CITRUS AND SMOKING HABITS

Good Diet — Nonsmokers

Characteristic	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Mean (mg. percent)	.76	1.26	1.26	1.27
Standard deviation (mg. percent)	.28	.17	.09	.12
Coefficient of variation	37	13	7	10

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (mg. percent)	.50	.0	.01	.51
Standard error of difference	.15	.12	.07	.14
Observed t value	3.418	0	.145	3.723
P	<.01	.5	.5	<.01

Poor Diet—Smokers

Characteristic	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Mean (mg. percent)	.13	1.36	.42	.46
Standard deviation (mg. percent)	.06	.16	.20	.10
Coefficient of variation	46	12	48	22

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (mg. percent)	1.23	.94	.04	.33
Standard error of difference	.10	.15	.13	.07
Observed t value	12.149	6.269	.389	4.751
P	<.001	<.005	.5	<.01

Consistent with the diet subgroups, the smoker-nonsmoker subgroups show less variability at 48 hours than initially as demonstrated in Table 3.

Combination of Habits: Since differences in smoking and citrus intake yield different tolerance curves, it was felt that the selection of groups on the basis of coexisting factors might reveal even more divergence. Thus, those who both smoke and partake poorly of citrus products should yield a group response greatly distinct from those at the other end of the scale —those who partook well of citrus fruits and those who do not smoke. That this is true is clear from an examination of Figure 4 and Table 4. The good diet-nonsmoker group ascends swiftly in 15 minutes and maintains the high level. The poor diet-smoker category shows a remarkable rise at 15 minutes but the average score falls precipitously at 24 hours although the 48 hour level remains above the original, preinjection level.

A reduction in the degree of variability at 48 hours is still evident when one compares the coefficients of variation for each group initially and at 48 hours.

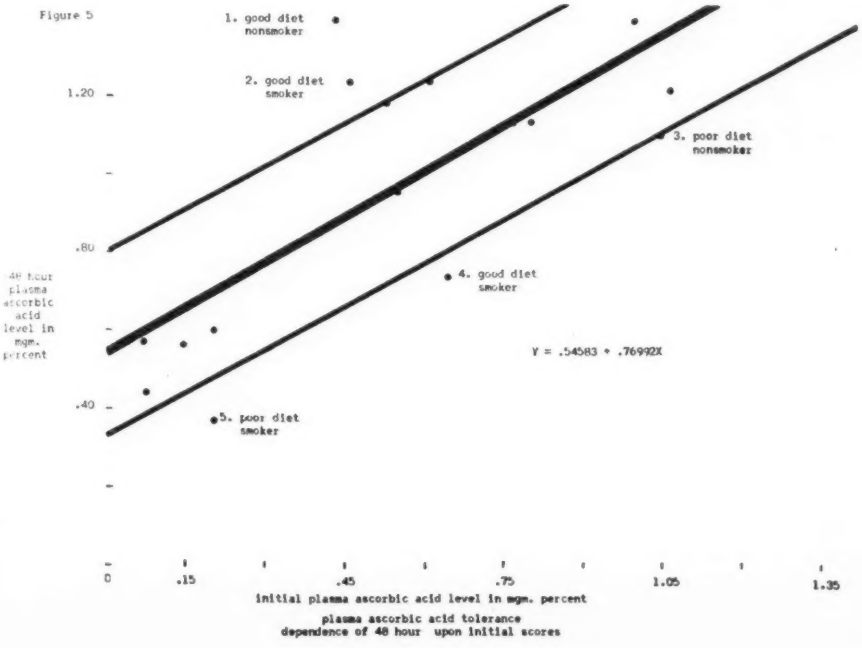
Single Determinations (Initial Values) Versus Tolerance Testing: Initial findings may be interestingly compared to tolerance results in two respects: (1) dependence of 48 hour values upon the initial levels, and (2) the degree of homogeneity of the various subgroups (smokers, diet) initially and at 48 hours postinjection.

TABLE 5

PLASMA ASCORBIC ACID TOLERANCE VERSUS INITIAL SCORES

Coefficient of correlation	+.739
Observed t value	4.101
P	.005
48 hour plasma level	.54583 + (.76992 times the initial plasma level)
Standard error of estimate	.23700

Figure 5



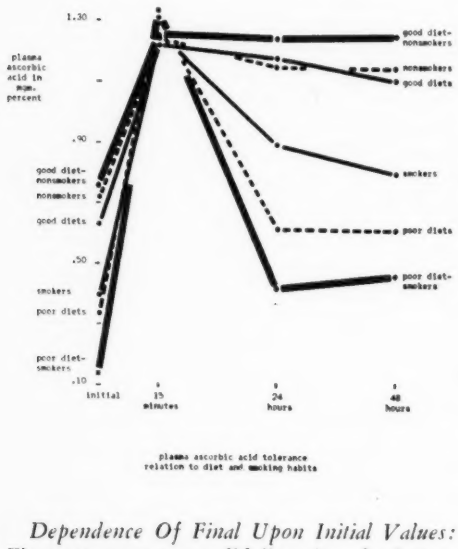
plasma ascorbic acid tolerance dependence of 48 hour upon initial scores

TABLE 6

PLASMA ASCORBIC ACID GROUPING TENDENCIES AT VARIOUS INTERVALS POST-TOLERANCE — MEAN DIFFERENCES OF GROUPS

Group		*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Good diet vs. Poor diet	Mean difference	.30	.09	.56	.50
	P	> .1	> .2	< .005	< .01
Smokers vs. nonsmokers	Mean difference	.33	.01	.27	.35
	P	> .05	.5	> .1	< .05
Good diet — nonsmoker vs. Poor diet — smoker	Mean difference	.63	.10	.84	.81
	P	< .005	> .14	< .001	< .001

Figure 6



plasma ascorbic acid tolerance relation to diet and smoking habits

Dependence Of Final Upon Initial Values: Figure 5 suggests a valid linearity of relationship between initial levels and levels at 48 hours following the intravenous injection of 1 gm. of ascorbic acid. In other words, subjects with higher initial plasma ascorbic acid levels strive to sustain higher levels at 48 hours. The degree of the relationship is expressed in Table 5 as the coefficient of correlation ($r = .739$). The broad middle line in Figure 5 is the line of regression of 48 hour levels on initial values. This line is calculated to be that direction which would be definitive of the relationship between initial and 48 hour values if all sources of error could be removed and if, in fact, the relationship were exactly linear. The two narrower lines parallel to the degression line represent the average divergence of the 48 hour scores from those expected as calculated from the linear equation. These narrow lines mark the limits of the standard error of the estimate. This divergence may be conceived as average fluctuations of values due to chance errors of observation. Thus, subjects falling within the limits of one standard error can be said to conform to the linear pattern. Figure 5 shows that there were five subjects who revealed positions outside of this calculated range. They may be considered deviates from the central theme.

Initial Versus Tolerance Scores As Group Discriminators: Figure 6 is a composite of the tolerance responses of the various smoker and diet subgroups. An overall view of this graph reveals that the groups differ from one another at each test period except 15 minutes post-injection. It is also clear from this figure that there is considerable "fanning" of the mean scores at 48 hours. In other words, although the subgroups differ originally, they become more widely separated (discrete) at 48 hours.

TABLE 7

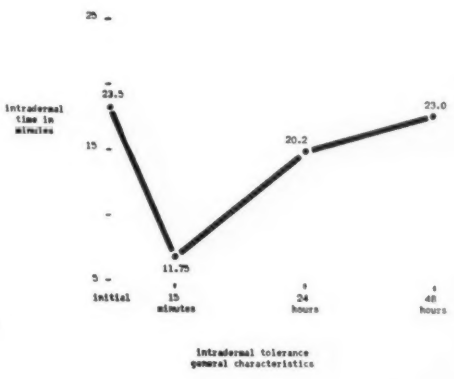
PLASMA ASCORBIC ACID GROUPING TENDENCIES AT VARIOUS INTERVALS POST TOLERANCE — DEGREE OF CENTRAL TENDENCY*

Group	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Good diet	36	12	13	23
Poor diet	123	10	57	47
Smokers	69	12	44	43
Nonsmokers	48	11	19	23
Good diet—nonsmokers	37	13	7	10
Poor diet—smokers	46	12	48	22

* Coefficient of variation = $\frac{\text{standard deviation}}{\text{mean}} \times 100$

(the larger the value, the less the central tendency)

Figure 7



This observation is statistically confirmed in Table 6. Mean differences, without exception, are greater at 48 hours than initially. More important, however, is to observe that group differences by way of the average are *all* significant at 48 hours, whereas only *one pair* (poor diet-smoker versus good diet-nonsmoker) presents a significant original difference. This is borne out by the fact that such scores become significant only when probability (P) is less than .05.

Another interesting way to visualize this same contrast is to compare the degree of central tendency of the subjects in each of the groups at 48 hours with that observed initially. Table 7 exhibits this contrast. In every group the degree of variability is higher initially than at 48 hours. This means that, in addition to the groups becoming more widely separated from each other at 48 hours, the intragroup scores are also more homogeneous. In other words, there is a greater similarity of scores among the individual subjects of any one group. Thus, smoker and diet groups act more like single units at 48 hours.

Parenthetically, it should be noted in Table 7 that groups, assumed to be substandard with regard to ascorbic acid status, are also those same groups which tend to exhibit the greatest variability. Thus it is that initially those subjects on a good diet show a coefficient of variation of 36 while those on a poor diet a value of 123. At 48 hours, although the variability is reduced in both cases, still the good diet group reveals less variation (23) than the poor diet category (47). This same relationship holds for the other groups so that smokers are more variable than nonsmokers and good diet-non-smokers less variable than poor diet-smokers.

Intradermal Tolerance Analysis: The intradermal tolerance data will be presented within the same framework as the previously described plasma tolerance analysis: (1) general characteristics, (2) relationship to smoking and citrus intake habits, and (3) relationship of initial to tolerance results.

General Characteristics: As the intradermal time becomes lower, ascorbic acid levels are increasing. Thus, Figure 7 which represents the average intradermal response of the sixteen dental students, is almost a mirror image of the general plasma ascorbic acid response to the intravenous injection of 1 gm. of ascorbic acid pictorially shown in Figure 1. Table 8 lists the statistical elements of the group reaction to the load dose. There is a statistical difference between the initial and 15 minute postinjection scores, and between the 15 minute and 24 hour scores. Thus, the general sequence is one of decline in time at 15 minutes, ascent at 24 hours and relatively no further change at 48

TABLE 8

INTRADERMAL TOLERANCE — GENERAL CHARACTERISTICS

Characteristic	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Mean (minutes)	23.5	11.8	20.2	23.0
Standard deviation (minutes)	8.81	3.37	6.03	8.06
Coefficient of variation	37	29	30	35

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (minutes)	11.8	8.4	2.8	.5
Standard error of difference	2.35	1.73	2.52	2.99
Observed t value	5.000	4.879	1.115	.167
Degrees of freedom	30	30	30	30
P	< .001	< .001	> .2	.5

hours. The 48 hour scores are essentially not different from the original levels.

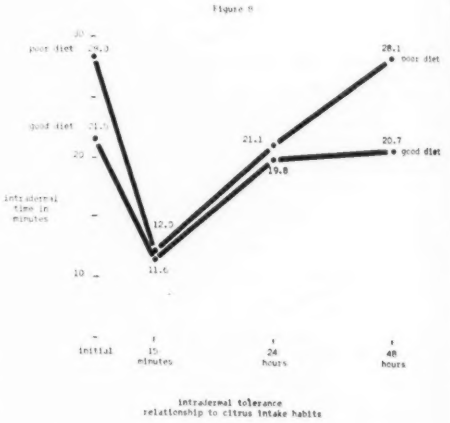
The variability (coefficient of variation) is slightly lower at 48 hours than initially although the index is essentially constant at each test period.

Relationship To Smoking and Citrus Intake Habits: Students were again grouped as discussed under plasma tolerance results. Intradermal tolerance curves have been developed for each of these groups.

Citrus Intake: Figure 8 displays the comparative intradermal tolerance responses of persons on a good versus those on a poor citrus regime. To ascertain the truth of the plotted changes, one may take note of Table 9. Both groups show a decided drop in intradermal time at 15 minutes postinjection and a significant upswing at 24 hours. Group differences from 24 to 48 hours are not significant.

Smoking Habits: As shown in Figure 9 and calculated in Table 10, the intradermal time decreases significantly 15 minutes and 24 hours postinjection in both the smoker and nonsmoker groups. In neither group is there a significant change at 48 hours nor is there any marked difference in either category between the initial (preinjection) and 48 hour (postinjection) scores.

Combination of Habits: As shown in Figure 10 and in Table 11, the good diet-nonsmoker category reacts to the load injection of ascorbic



acid by a reduction in the intradermal time at 15 minutes, a rise at 24 hours, and no change at 48 hours. On the other hand, the plotted changes in the poor diet-smoker group are not significant at any test period. This reflects the smallness of the sample (three subjects) rather than an inherent tendency of the group.

The reduction in degree of variability at 48 hours over the initial levels is evidenced in the coefficients of variation listed in Table 11.

Single Determinations (Initial Values) Versus Tolerance Testing: Initial findings will be compared to tolerance results in the same manner as with the plasma data previously outlined.

TABLE 9

INTRADERMAL TOLERANCE — RELATION TO CITRUS INTAKE

	Good Diet			
		Postinjection		
Characteristic	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Mean (minutes)	21.5	11.6	19.8	20.7
Standard deviation (minutes)	6.10	3.19	5.62	6.57
Coefficient of variation	28	27	28	32

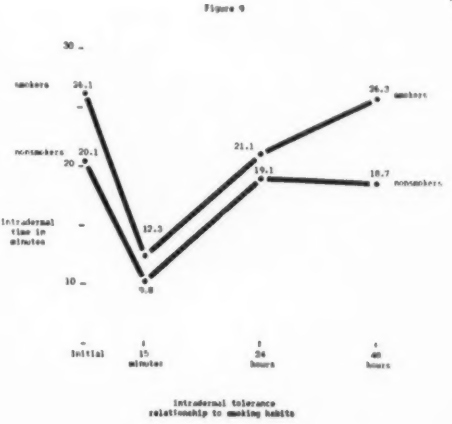
	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (minutes)	9.9	8.2	.9	.8
Standard error of difference	2.08	1.95	2.61	2.70
Observed t value	4.769	4.210	.345	.296
Degrees of freedom	20	20	20	20
P	< .001	< .001	.5	.5

	Poor Diet			
		Postinjection		
Characteristic	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Mean (minutes)	28.0	12.0	21.1	28.1
Standard deviation (minutes)	12.67	4.08	7.48	9.02
Coefficient of variation	45	34	35	32

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (minutes)	16.0	9.1	7.0	.1
Standard error of difference	5.96	2.97	4.67	6.96
Observed t value	2.688	3.062	1.050	.014
Degrees of freedom	8	8	8	8
P	< .025	< .025	> .7	.5

Dependence Of Final Upon Initial Values: Figure 11 suggests a valid linearity of relationship between the initial and 48 hour intradermal times. In other words, persons who exhibit lower levels initially also reveal lower levels at 48 hours. As recorded in Table 12, the degree of association of the initial and 48 hour scores is expressed in the coefficient of correlation ($r = .543$). The standard error of the estimate is 6.55 minutes. This means that the observed 48 hour values differ by 6.55 minutes, on the average, from those expected if the line were perfect. Subjects who fall within this standard error (the lines parallel to the regression line in Figure 11) are considered to conform to the linear pattern. There are four subjects outside of this range who can

Figure 9



Intradermal tolerance relationship to smoking habits

TABLE 10

INTRADERMAL TOLERANCE — RELATION TO SMOKING

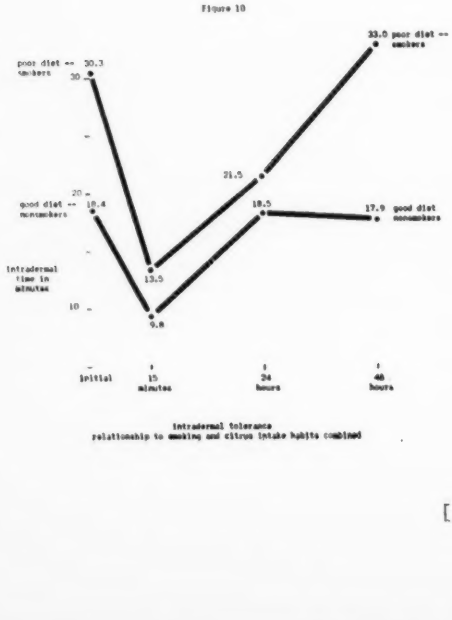
	Nonsmokers			
		Postinjection		
Characteristic	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Mean (minutes)	20.1	9.8	19.1	18.7
Standard deviation (minutes)	6.22	1.11	4.21	3.59
Coefficient of variation	31	11	22	19

	Initial vs. 15 min.	*vs. 24 hr.*	*vs. 48 hr.*	*vs. Initial*
Mean difference (minutes)	10.3	9.3	.4	1.4
Standard error of difference	2.39	1.65	2.09	2.71
Observed t value	4.315	5.653	.192	.517
Degrees of freedom	12	12	12	12
P	< .005	< .001	.5	.5

	Smokers			
Characteristic	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Mean (minutes)	26.1	12.3	21.1	26.3
Standard deviation (minutes)	9.94	3.90	7.23	9.13
Coefficient of variation	38	32	34	35

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (minutes)	13.8	8.8	5.2	.2
Standard error of difference	3.56	2.74	3.88	4.49
Observed t value	3.876	3.214	1.341	.045
Degrees of freedom	16	16	16	16
P	< .005	< .01	> .1	.5

Figure 10



Intradermal tolerance relationship to smoking and citrus intake habits combined

be considered as diverging from the essential pattern.

Initial Versus Tolerance Scores As Group Discriminators: Figure 12 is a composite of the tolerance responses of all of the groups. The overall feature is that the groups differ from one another most strikingly initially and at 48 hours. At 15 minutes and 24 hours, the differences are relatively small. The greatest "fanning out" of the groups is evident at 48 hours. These observations are statistically presented in Table 13. Mean group differences are greatest at 48 hours postinjection. More pertinent, however, is the fact that none of the differences in group intradermal times are significant initially. At 48 hours, only the good diet-poor diet pair are insignificantly divergent.

Table 14 presents another view of the group responses. It lists the indices of homogeneity

TABLE 11

INTRADERMAL TOLERANCE — RELATION TO COMBINED CITRUS AND SMOKING HABITS

Good diet — Nonsmokers

Characteristic	*Initial*	*Postinjection 15 min.*	*24 hr.*	*48 hr.*
Mean (minutes)	18.4	9.8	18.5	17.9
Standard deviation (minutes)	5.56	1.25	3.87	3.62
Coefficient of variation	30	13	21	20

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (minutes)	8.6	8.7	.6	.5
Standard error of difference	2.34	1.82	2.28	2.71
Observed t value	3.678	4.779	.263	.184
Degrees of freedom	8	8	8	8
P	$< .01$	$< .005$	.5	.5

Poor diet — Smokers

Characteristic	*Initial*	*Postinjection 15 min.*	*24 hr.*	*48 hr.*
Mean (minutes)	30.3	13.5	21.5	33.0
Standard deviation (minutes)	13.88	4.92	9.54	6.96
Coefficient of variation	46	36	44	21

	Initial vs 15 min.	*vs 24 hr.*	*vs 48 hr.*	*vs Initial*
Mean difference (minutes)	16.8	8.0	11.5	2.7
Standard error of difference	8.51	6.20	6.82	8.79
Observed t value	1.975	1.291	1.686	.301
Degrees of freedom	4	4	4	4
P	$> .1$	$> .2$	$> .1$	.5

(coefficients of variation for each of the subgroups. It is clear that there is greater intragroup similarity at 48 hours than initially as the individual subjects fall into more discrete categories. This is true with the exception of the good diet-poor diet pair. Even within this category, the poor diet subgroup exhibits less variability initially than at 48 hours.

Here, as with plasma subgroupings, it should be mentioned parenthetically that persons who, in general, would be expected to need more than usual ascorbic acid (smokers, poor diet) present a greater group variability. Table 14 shows this to be true with every group-pair and every test period except the 48 hour period where both the good and poor diet subgroups demonstrate the same variability.

Comparison Of Intradermal And Plasma Tolerance Results: The intradermal and plasma ascorbic acid tolerance data will be explored as to differences in: (1) general characteristics, (2) relationships to citrus and smoking habits, and (3) relationships to initial values.

General Characteristics: Figure 1 and Table 1 present the general characteristics of the plasma ascorbic acid tolerance test. Figure 7 and Table 8 record these same features of the intradermal test. Since the intradermal time declines as the plasma ascorbic acid level ascends, the intradermal tolerance profile is almost a mirror image of the plasma response. However, two contrasts are evident upon examination of Tables 1 and 8. Firstly, an analysis of differences from test period to test period reveals

Figure 11

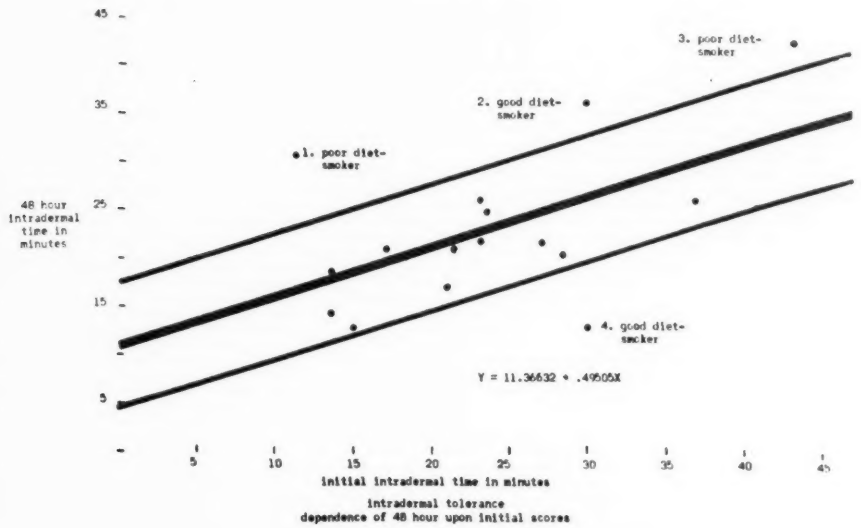


TABLE 12

INTRADERMAL TIME — TOLERANCE VERSUS INITIAL

Coefficient of correlation	+ .543
Observed t value	2.422
P	< .05

48 hr. intradermal time (minutes) = 11.36632 + (.49505 times the initial intradermal time)
Standard error of estimate (minutes) 6.55906

that, whereas the group plasma level remained raised at 48 hours, the intradermal time had returned to its original level at this time. Secondly, it is of interest that initial and 48 hour intradermal times exhibited less variability than the plasma ascorbic acid scores at those same two test periods. This was observed to be true of initial scores in an earlier study.[1]

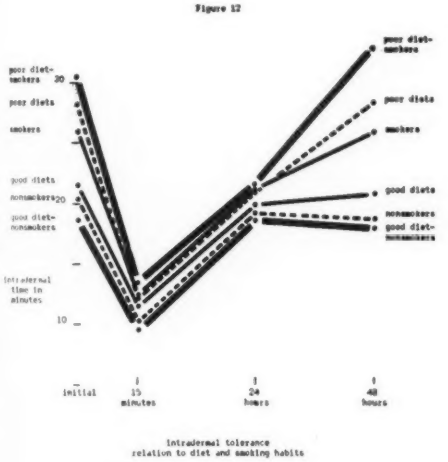
Relationships To Citrus Intake and Smoking Habits: Here again, for purposes of comparison and consistency with the already established format of this report, attention will be focused successively upon three subgroup pairs: (1) good versus poor citrus intake, (2) smokers versus nonsmokers, and (3) combinations of smokers-poor diet versus nonsmokers-good diet.

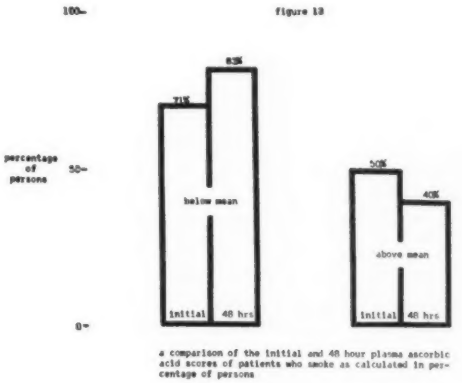
Citrus Intake: Figures 2 and 8 with accompanying Tables 2 and 9 offer a contrast between intradermal response and plasma ascorbic acid changes. The plasma levels of the good diet group rise sharply and remain above the initial values even at 48 hours. On the other hand, the responses of the poor diet group are different in that the 48 hour level returns to that of the initial level. Meanwhile, both the poor and good diet groups show a return of the intradermal time at 48 hours to those observed initially.

TABLE 13

INTRADERMAL TIME GROUPING TENDENCIES AT VARIOUS INTERVALS POST TOLERANCE — MEAN DIFFERENCE OF GROUPS

Group		*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Good diet vs. Poor diet	Mean difference	6.5	0.4	1.3	7.4
	P	> .2	.5	.5	> .1
Smokers vs. Nonsmokers	Mean difference	5.0	2.5	2.0	7.6
	P	> .2	> .05	> .4	< .05
Good diet — Nonsmokers vs. Poor diet — Smokers	Mean difference	11.9	3.7	3.0	15.1
	P	> .2	> .2	.5	< .025





Again, in both citrus categories, intradermal time variability is less than that of the plasma scores initially and at 48 hours as shown in Tables 2 and 9.

Smoking Habits: Figures 3 and 9 approximate to mirror images with regard to mean responses. However, a more sustained influence on plasma concentration is evidenced by the fact that both smokers and nonsmokers remain above initial levels at 48 hours. In contrast, the 48 hour intradermal times return to the original levels.

Combination Of Habits: The most striking reactions of the plasma levels and intradermal times are represented in Figures 4 and 10 and analyzed in Tables 4 and 11. The good diet-nonsmoker category responds with a prompt elevation in plasma concentration which is sustained throughout the other test periods. This same group exhibits a similar 15 minute intradermal change. However, at 48 hours the intradermal time has returned to its original value. None of the intradermal changes of the poor diet-smoker group are significant. Plasma levels of this category demonstrate a significant upturn at 15 minutes, a downswing at 24 hours,

TABLE 14

INTRADERMAL TIME GROUPING TENDENCIES AT VARIOUS INTERVALS POST TOLERANCE — DEGREE OF CENTRAL TENDENCY*

Group	*Initial*	*15 min.*	*24 hr.*	*48 hr.*
Good diet	28	27	28	32
Poor diet	45	34	35	32
Smokers	38	32	34	35
Nonsmokers	31	11	22	19
Good diet — nonsmokers	30	13	21	20
Poor diet — smokers	46	36	44	21

* Coefficient of variation = $\frac{\text{standard deviation}}{\text{mean}} \times 100$

The larger the value, the less the central tendency.

no change at 48 hours, although the 48 hour level remains above the initial values.

Single Determinations (Initial Values) Versus Tolerance Testing: Initial findings will be compared to tolerance results in the same manner as previously reported with plasma ascorbic acid and intradermal time data.

Dependence Of Final Upon Initial Values: Both plasma levels and intradermal times reflect an association of 48 hour values with initial scores. The relationships are shown graphically in Figures 5 and 11. Plasma changes express the greatest degree of linearity with a coefficient of correlation of .739 (Table 5). The coefficient of correlation of intradermal changes is .543 (Table 12). Thus, it can be said that intradermal scores at 48 hours postinjection are less dependent upon initial scores. There are 5 deviates from the main plasma theme (Fig. 5). Only 4 subjects (Fig. 11) deviate from the central intradermal pattern.

It will be recalled that groups tend to be more distinct at 48 hours than initially. This, visible in Figures 6 and 12, is true of both plasma and intradermal responses. According to the evidence outlined in Table 6, the groups all become distinct at 48 hours, with regard to plasma pattern. With the obvious exception of the good diet-poor diet pair, this is also true of the intradermal response (Table 13).

Tables 7 and 14 show that intradermal time tends to be less variable than plasma level, although this is not consistently true.

a comparison of the initial and 48 hour plasma ascorbic acid scores of patients with poor citrus intake as calculated in percentage of persons

DISCUSSION

There are two general questions which, arising quite logically from this study, demand some discussion: (1) Is there any evidence that tolerance testing yields information not obtainable from the initial findings? (2) Do the results suggest that either of the two indices of ascorbic acid status (intradermal time and plasma ascorbic acid level) is better than the other?

Single Values (Initial Scores) Versus Tolerance Results: If the temporal patterns of the plasma levels of each of the 16 students, prior to and following ascorbic acid load-dosing, are plotted, one notes that some levels remain high, some drop sharply while others claim an intermediate position at 48 hours. Returning

TABLE 15

PLASMA ASCORBIC ACID
GOOD DIET — POOR DIET DIFFERENCES
INITIALLY AND AT 48 HRS.

	Deviates Excluded	*Deviates Included*
Initial mean differences	.53	.30
48 hour mean differences	.57	.50
	+ .04	+ .20

to the concept that a tolerance test indicates need, these results can be interpreted in two ways. From one point of view, one can say that retention of ascorbic acid in the blood indicates need. In this case, persons whose plasma levels remain elevated are those who need the vitamin. On the other hand, one can assume that the loss of the vitamin from the blood indicates that the "tissues" are taking it up and that persons whose levels fall off are those who are in need of the ascorbic acid. This same description would hold for the intradermal time results if *down* be substituted for *up*.

Obviously, it is necessary to know exactly what happens to the injected vitamin to understand whether either view is valid. Such information is not available in this study. In spite of this void, there is a strong suggestion that the latter view is more tenable.

Figures 2, 3 and 4 demonstrate that the tendency of persons who partake well of citrus products, those who do not smoke, and those who combine these two properties, is to main-

TABLE 16

PLASMA ASCORBIC ACID —
NONSMOKER-SMOKER DIFFERENCE
INITIALLY AND AT 48 HOURS

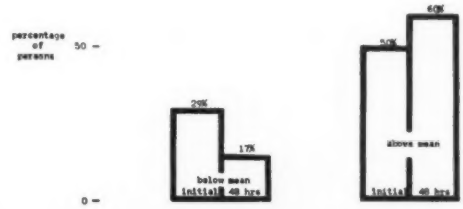
	Deviates Excluded	*Deviates Included*
Initial mean difference	.35	.33
48 hour mean difference	.29	.35
	— .06	+ .02

figure 15

a comparison of the initial and 48 hour plasma ascorbic acid scores of patients with poor citrus intake and who smoke as calculated in percentage of persons

tain a relatively high post-tolerance plasma ascorbic acid level. This, in reverse, is true of the intradermal response (Figures 8, 9, and 10). Exactly the reverse occurs to the opposite groups who smoke and have poor dietary intake of citrus products. It is apparent, from experience of other investigators, that citrus fruits and juices carry the main weight of a person's ingestion of ascorbic acid. It follows that persons on a good citrus diet are, for the most part, better off than those on a poor dietary intake. Furthermore, if this be true, then a sustained high plasma response indicates *relatively* more satisfactory status. Summed up more simply, persons whose habits indicate a better ascorbic acid status reveal a sustained high plasma level at 48 hours. There is evidence

figure 16



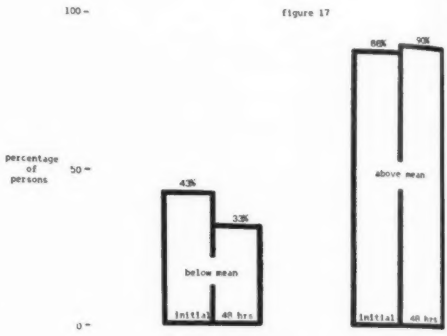
a comparison of the initial and 48 hour plasma ascorbic acid scores of patients who do not smoke as calculated in percentage of persons

TABLE 17

PLASMA ASCORBIC ACID — GOOD DIET-NONSMOKER AND POOR DIET-SMOKER DIFFERENCES INITIALLY AND AT 48 HOURS

	Deviates Excluded	*Deviates Included*
Initial mean difference	.74	.63
48 hour mean difference	.73	.81
	— .01	+ .18

figure 17



a comparison of the initial and 48 hour plasma ascorbic acid scores of patients with good citrus intake as calculated in percentage of persons

that smokers require increased amounts of ascorbic acid. Figure 3 shows that smokers fall out lower at 48 hours than nonsmokers. Figure 4 simply confirms these observations by demonstrating that persons who both smoke and partake poorly of citrus products fall lower than any other subgroup at the 48 hour test period. The same general case can be made for the intradermal results. The good diet group is lower at 48 hours (Fig. 8); the nonsmoker category is lower than the smoker group (Fig. 9); the good diet-nonsmoker group is lower at 48 hours than any other subgroup (Fig. 12).

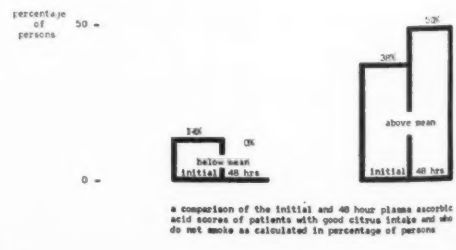
The upshot of these observations is that the tolerance pattern of persons who need less of the vitamin is sustained plasma elevation and lower intradermal time at 48 hours. A closer examination of the periodic components of these graphs (Figs. 2, 3, 4, 8, 9, 10) reveals that what has been stated to exist at the 48 hour test period is also true for the initial values. In other words, the various subgroups diverge from each other and in the same direction (smokers down in plasma and up in intradermal time, nonsmokers just the opposite pattern). The very obvious question, then, is whether the 48 hour values offer additional merit. The general statement can be made that the 48 hour groupings are more distinct than the initial ones. Put more simply, as pointed out in Figures 6 and 12 and in Tables 6 and 13, differences between groups become greater at 48 hours. Additionally, portrayed in Tables 7 and 14, the groups attain greater homogeneity at 48 hours. In other words, smoker and diet groups are behaving more like units 48 hours postinjection. Thus, if tobacco consumption and diet factor at all in the ascorbic acid status of man, it is certain that a test which is more selective of these components is better than a less selective procedure.

TABLE 18

INTRADERMAL TIME — GOOD DIET-POOR DIFFERENCES INITIALLY AND AT 48 HOURS

	Deviates Excluded	*Deviates Included*
Initial mean difference	9.1	6.5
48 hour mean difference	2.7	7.4
	— 6.4	+ .9

figure 18



a comparison of the initial and 48 hour plasma ascorbic acid scores of patients with good citrus intake and who do not smoke as calculated in percentage of persons

TABLE 19

INTRADERMAL TIME — NONSMOKER-SMOKER DIFFERENCES INITIALLY AND AT 48 HOURS

	Deviates Excluded	*Deviates Included*
Initial mean difference	4.1	5.0
48 hour mean difference	4.3	7.6
	+ .2	+ 2.6

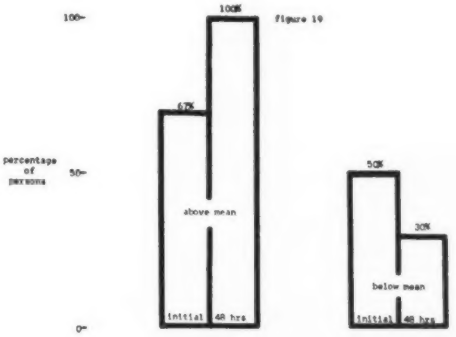


Figure 19

a comparison of the initial and 48 hour intradermal time of patients who smoke as calculated in percentage of persons

There is another way of envisaging this same reorganization of persons. One can simply calculate mean values of the initial and 48 hour scores, count the persons above and below this point and calculate the percentage of subjects, above and below, who describe a particular habit. For example, there may be more nonsmokers above the plasma mean at 48 hours than above the initial mean. One could then say forthrightly that the tolerance procedure has ushered in a more selective distribution of types which, in turn, are forces of some moment in the determination of ascorbic acid status. That this is just what happens is depicted in Figures 13 through 18 (plasma data) and 19 through 24 (intradermal data). It can be seen, for example, that there are more smokers below the mean for the group than above (Fig. 13). This is true initially and 48 hours postinjection. The significant feature is that, in every case, the percentage of smokers, poor diet, and combination of these two habits below the 48 hour plasma mean is greater than the proportion of these same persons below the initial mean (Figs. 13, 14, 15). The same observation is essentially true of the intradermal reshuffling at 48 hours (Figs. 19, 20, 21). The good diet, nonsmoker, and combination categories show a greater tendency to remain above the 48 hour plasma mean than observed with the initial mean (Figs. 16, 17, 18). Again, this consistently greater clustering of similar types is true when the intradermal time is employed as the criterion (Figs. 22, 23, 24).

One very interesting relationship should be noted as further suggestion that tolerance testing is better than single value determinations. It will be recalled that the theoretical reasons why tolerance testing should be a more sensitive index of ascorbic acid were pointed out

TABLE 20

INTRADERMAL TIME — GOOD DIET-NONSMOKERS AND POOR DIET-SMOKERS DIFFERENCES INITIALLY AND AT 48 HOURS

	Deviates Excluded	*Deviates Included*
Initial mean difference	18.6	11.9
48 hour mean difference	8.1	15.1
	— 10.5	+ 3.2

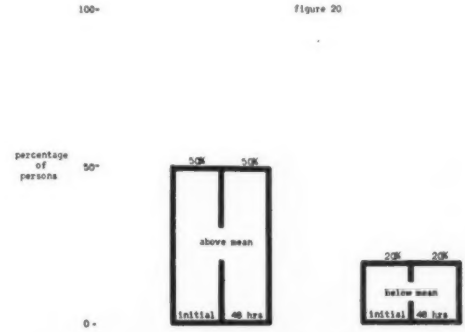


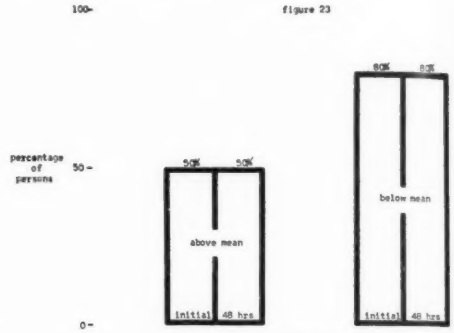
Figure 20

a comparison of the initial and 48 hour intradermal time of patients with poor citrus intake as calculated in percentage of persons

figure 21

a comparison of the initial and 48 hour intradermal time of patients with poor citrus intake and who smoke as calculated in percentage of persons

figure 23

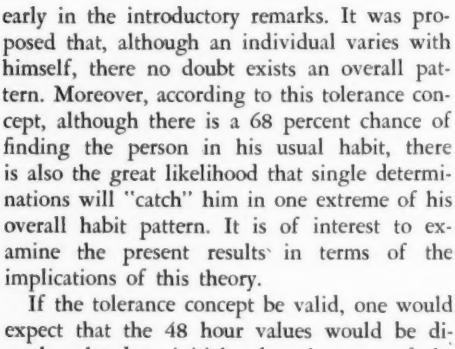


a comparison of the initial and 48 hour intradermal time of patients with good citrus intake as calculated in percentage of persons

early in the introductory remarks. It was proposed that, although an individual varies with himself, there no doubt exists an overall pattern. Moreover, according to this tolerance concept, although there is a 68 percent chance of finding the person in his usual habit, there is also the great likelihood that single determinations will "catch" him in one extreme of his overall habit pattern. It is of interest to examine the present results in terms of the implications of this theory.

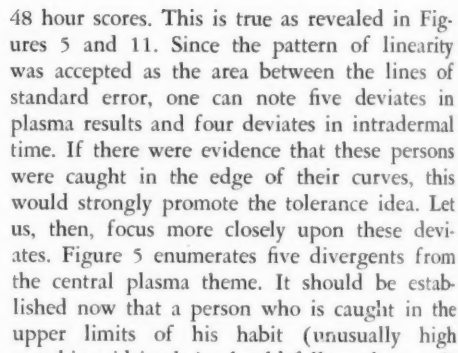
If the tolerance concept be valid, one would expect that the 48 hour values would be directly related to initial values in most of the students. In other words, since there is a 68 percent chance of catching the subject in his customary habit, one would anticipate that most of the initial times would be as valid as the 48 hour scores. This is true as revealed in Figures 5 and 11. Since the pattern of linearity was accepted as the area between the lines of standard error, one can note five deviates in plasma results and four deviates in intradermal time. If there were evidence that these persons were caught in the edge of their curves, this would strongly promote the tolerance idea. Let us, then, focus more closely upon these deviates. Figure 5 enumerates five divergents from the central plasma theme. It should be established now that a person who is caught in the upper limits of his habit (unusually high ascorbic acid intake), should fall out low at 48 hours. On the other hand, a person chanced upon during an unusually low ascorbic acid intake, should claim a higher fallout at 48 hours. Thus, in Figure 5, subjects #1 and #2

figure 22



a comparison of the initial and 48 hour intradermal time of patients who do not smoke as calculated in percentage of persons

figure 24



a comparison of the initial and 48 hour intradermal scores of patients with good citrus intake and who do not smoke as calculated in percentage of persons

fell out high, even though their original levels were low. They both described good intake habits and one did not smoke. This makes good sense in terms of the thesis of individual variation. Subjects #1 and #2 were tested at a period of low citrus intake (plasma level about .40 mg. percent) and their usual habit of good intake was not evidenced in the low initial value. Yet, upon tolerance testing, they claimed a position akin to persons with initial plasma levels from .93 to 1.08 mg. percent. Subjects #3, #4, and #5 (Fig. 5) fell out at 48 hours below the main response. Subject #3 had a high initial value but fell out at 48 hours with a plasma level like persons with an initial plasma ascorbic acid level of .70 mg. percent. Thus, he was initially tested at an unusually high intake time. This is supported by his own testimony that he ordinarily does not ingest much citrus fruit or juices. The fact that he is a nonsmoker accounts for his not falling out even lower. After all, the evidence suggests that smokers are at greater risk of need. Subject #4 does not fit the pattern so well. He started out with an intermediate level but fell to a very low point at 48 hours. Although he described a good diet, he did smoke. Perhaps he was caught initially at a time when his smoking habit was unusually mild. Subject #5 is unusual. Although his plasma score was very low originally, he still claimed a lower than usual position at 48 hours. This means that, although he was caught in the upper reaches of his habit, still the upper limits were low compared to the responses of other persons. So, the initial plasma value did not indicate the true severity of his low status. This subject was at great risk for being quite low. He both smoked and reported a poor citrus intake.

This same analysis can be applied to the intradermal deviates with the same conclusions. The reader may quite easily object that there is much to do about nothing. After all, there are so many variables operating such as subjectivity, examiner error, other sources of ascorbic acid, other forces conspiring to alter the vitamin values. The answer to this objection, in general terms, is that these are just the very factors which tolerance testing attempts to overcome by putting bodily wisdom to work. More specifically, it can be noted that body wisdom is trying to be inferred by comparison with crude, original data. It is true that the 48 hour data are also crude. However, by merely observing that they follow the theory previously expounded, one must be convinced that it could be true.

Let us assume, for the moment, that the tolerance concept is true. If it is sound, then one expects to find most 48 hour values the same as initial ones. In other words, the number of alien scores should be less than those conforming to the dominant mode. This was found to be the case. Five out of 16 subjects deviated from the plasma pattern whereas four of 16 intradermal responses were nonconformist. Additionally, and this is an interesting deduction, one would expect that the removal of the deviates from any group should leave subjects whose initial values are highly associated with 48 hour scores. If this were done, namely eliminate the deviates, it should follow theoretically that the differences previously observed between groups at 48 hours and initially should, for all practical purposes, vanish. In other words, after extraction of the deviates, the tolerance test is no longer adding any possible diagnostic value. Therefore, groups should not gain in distinction at 48 hours if the deviates are erased. Also, the previously noted disparity of smoker and diet types above and below the 48 hour and initial means should also vanish. This is almost exactly the case with plasma groupings minus deviates as outlined in Tables 15-17. As is to be expected, the differences between groups plasmawise is almost equal when the initial and final values are compared. With the deviates included, 48 hour group differences are greater than the initial differences. Not only is this relationship not true of all of the intradermal responses, but the trend is actually reversed in two cases, the good diet-poor diet pair and the combination pair (Tables 18-20). Table 19 illustrates that the smoker-nonsmoker pair does not follow the pattern exhibited by plasma groupings. The point is, whereas the 48 hour levels are more sensitive to smoker and diet types, they lose

this sensitivity when deviates are extracted, and become more like the original values.

The simple essence of the preceding analysis is that deviates are not, in fact, deviates. It is suggested that they conform to the group pattern at 48 hours, whereas initially they were caught during an unusual smoking or dietary experience. In respect of these proposals, the validity of tolerance testing is strongly supported.

Plasma Versus Intradermal Tolerance: Evidence is not overwhelmingly in favor of one ascorbic acid index over the other. There are three points which mildly favor the intradermal test.

First, as previously noted (Table 7 contrasted with Table 14), the intradermal groupings tend to exhibit less variability than those same plasma categories. This, however, is not a consistent finding. Secondly, intradermal results seem to be more selective of smokers and nonsmokers than plasma changes. Plasma levels appear to be more sensitive of diet. Selectivity of persons with combined habits is equal. But, according to the tables shown earlier, plasma changes are more indicative of diet than of tobacco consumption (Table 6). The reverse is true of the intradermal pattern (Table 13). Also, intradermal time regains initial values faster than the plasma ascorbic acid levels (contrast Fig. 1 and 8). A load injection of 1 gm. of ascorbic acid is no different than dietary ascorbic acid. Since the plasma levels are more sensitive to the introduction of this substance (they remained above initial levels even at 48 hours), this is more evidence that the plasma ascorbic acid is more closely akin to dietary ascorbic acid than the intradermal time. This is also the reason why intradermal results show a lower coefficient of correlation between initial and 48 hour scores than plasma data.

This observation, confirmed in an earlier report,[1] does not add positive merit to the intradermal time. It only detracts from the significance of the plasma ascorbic acid level. The intake and tissue needs of a particular substance are two distinct problems. If tobacco consumption truly increases the need for ascorbic acid or in some obscure way interferes with ascorbic acid absorbtion and/or utilization, then the intradermal test may be a valid measurement of tissue need.

One last remark is unrelated to the main thesis of this study. However, it is a curiosity which persisted prominently throughout the experiment. The groups, the poor diet and smokers, who would seem to be in poorer health vitaminwise, showed a consistently higher variability index than their opposites, the good diet and nonsmoker groups. What this might signify is not completely clear. Possibly, this may mean that the ascorbic acid status exerts a less dominant effect upon the plasma ascorbic acid and intradermal time when its level is low. Or, put another way, more variables are able to impose their influence upon these two ascorbic acid barometers only when the ascorbic acid concentrations are low.

In the final analysis, the whole concept of laboratory testing is to obtain a test which reveals immediate need. This means that it must express the additive effects of all mitigating factors. In other words, it must measure duration and intensity of the deficiency state. To do this it must somehow measure ascorbic acid function at the cellular level. Although not at all conclusive, the preceding account proposes evidence that this might be true.

SUMMARY AND CONCLUSIONS

1. A concept of tolerance testing is described in some detail.

2. Sixteen dental students were subjected to an intravenous load dose of 1 gm. of ascorbic acid. Plasma ascorbic acid levels and intradermal times were performed at various periods postinjection.

3. Evidence is presented that tolerance testing yields more critical information than single test values.

4. Comparative evidence only mildly favors the intradermal time tolerance response as more informative than the plasma ascorbic acid tolerance test.

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LE TEST INTRADERMAL DE ACIDO ASCORBIC

Parte IV. Un Studio de Tests de Tolerantia in Dece-Sex Studentes Dental

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SUMMARIO IN INTERLINGUA

Esseva signalate in un previe reporto que le ver comenciamento de un morbo precede per multo su expression clinic. In altere parolas, un longe tempore ante le presentia de symptomas e signos de un morbo, le processo pathologic es jam active al nivello cellular. Assi le problema perenne del investigation clinic es discoperir criterios e inventar methodos pro le recognition le plus precoce possibile del processo del morbo.

Es admittite generalmente que tests de tolerantia forni indices plus sensible del morbo que determinationes e altere studios individual. Le base de iste conclusion es le thema del prestente articulo. Illo es justificate in le forma de un analyse de tests de tolerantia in dece-sex supponitemente normal studentes dental.

Le articulo include le sequente sectiones:

1. Le autores describe in detalio lor conception de tests de tolerantia.

2. Dece-sex studentes medical esseva subjicite al injection intravenose de un carga de 1 g de acido ascorbic. Le nivellos de acido ascorbic in le plasma e le tempores intradermal esseva determinate a varie periodos post le injection.

3. Es presentate datos que prova que tests de tolerantia forni informationes plus critic que tests individual.

4. Datos comparative revela solmente leve grados de superioritate del informationes obtenite per tests de tolerantia a tempore intradermal in comparation con illos obtenite per tests de tolerantia pro acido ascorbic mesurate in le plasma.

WHY WE DON'T BEHAVE LIKE HUMAN BEINGS*

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PATTERNS OF REACTION

Kenneth Burke opens his book, *Permanence and Change,* with the story of a flock of chickens in a barnyard who are trained to gather around to be fed at the sound of a bell. Their "education", that is, their trained capacity to run forward at the sound of a bell, is advantageous to them in that it expedites their feeding. Ultimately, however, the farmer must send his chickens to market. In order to gather them quickly in a convenient place to chop their heads off, he rings the bell. Of course.

The disaster, from the chickens' point of view, can be said to lie in their education. The better they are "educated", the easier they are to manipulate, even to their own undoing. Let us say, however, that one of the chickens is what we call in educational circles a retarded student —he has never learned to run forward at the sound of the bell. When the other chickens run forward to their doom, he remains behind —and saves his neck. Perhaps there are undreamed-of advantages in never having gone to school, or in never having listened to your teacher if you did go.

Let me make myself clearer. The end product of education, yours and mine and everybody's, is the total pattern of reactions or potential reactions we have inside our skins. That pattern we have with us always. It is determining the way the reader is interpreting (or misinterpreting) these words at this very moment. Some readers, because of their habitual patterns of reaction, will read these words only to look for errors or misstatements that I may make in order that they may quarrel with my remarks. Some readers, again because of habitual patterns of reaction, will believe everything I say because it is in print; their education has left them with the belief that everything in a book (any book) is true. If they read a different book tomorrow that says the opposite, they will believe that, too. Some readers, and I trust that these constitute the majority, will read attentively, trying both to understand *what* I say and *what makes me say it;* they will delay their reactions, and then tomorrow, or two weeks hence, having tested my words against memory and experience and later reflection, they will decide whether or not this essay was good.

Our reaction-patterns are the internal and most important residue of whatever years of education or miseducation we may have received from all our experience, from all our parents' conduct towards us in childhood as well as their teachings, from all the formal education we may have had, from all the sermons and lectures we have listened to, from all the radio programs and movies and plays we have experienced, from all the books and newspapers and comic strips we have read, from the conversations we have had with friends and associates. At the end of all these experiences, some people come out with very strange patterns indeed. There are those, for example, who habitually confuse what is going on inside their heads with what is going on in the world outside. In the case of those suffering from persecution mania, for example, their reaction-patterns are such that if the thought passes through the patient's head that someone *might* be trying to poison him, he acts from then on as if someone *were* trying to poison him.

Some people, and this includes many well-known writers and intellectuals, radio commentators and analysts, as well as non-professionals who don't get paid for talking too much, have extraordinarily quick verbal responses to everything that happens, and these verbal responses occur so effortlessly and give them so much inward satisfac-

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tion that they never know and never will know whether those responses make sense or not. In other words, their habitual reaction-patterns is to lay down a verbal smoke-screen between themselves and the facts. These people rarely suspect any inadequacy in themselves, because in a world that values the verbal arts so highly they are regarded with envy as extremely clever people who, as the saying goes, "are never at a loss for words".

There is still another reaction-pattern shown by some radio listeners who forget, if they ever knew, that soap operas are merely plays; they seem to believe that the characters in soap operas are real people really undergoing the adventures portrayed in the dramatizations. These are the people who send wedding presents to the radio station when two of the characters in a play are married, and write letters of advice to fictional parents on how to deal with the problems of their fictional children. The basis of this confusion may be described as the confusion of symbols—in this case dramatic symbols—with the realities.

DEFINITIONS OF DEFINITIONS OF DEFINITIONS

I could go on describing different kinds of reaction-patterns, but this is enough to indicate roughly what semantics is about. Semantics is often defined in dictionaries as "the science of the meanings of words"—which would not be a bad definition if people didn't assume that the search for the meanings of words begins and ends with looking them up in a dictionary.

If one stops to think for a moment, it is clear that to "define" a word, as a dictionary does, is simply to explain the words with more words. To be thorough about defining, we should next have to define the words used in the definition, then define the words used in defining the words used in the definition . . . and so on. Defining words with more words, in short, gets us at once into what mathematicians call an "infinite regress". Yet—and here we come to another common reaction-pattern—people often act as if (1) words can be explained fully with more words, and (2) something basic will have been accomplished if this is done.

I recall a discussion on the subject of "peace" in which almost everyone present got involved in trying to define "peace"—so that the evening ended anything but peaceably. Even more remarkable was a meeting I once attended of jazz enthusiasts. A collection of famous jazz recordings had been assembled for the occasion and a panel of five experts to comment on them: the editor of a jazz magazine, a musicologist, a well known orchestra leader, and a couple of critics. The chairman started the meeting by asking each of the experts to define jazz. Every definition given turned out to be unsatisfactory to the other critics present, so that an argument started almost at once—an argument that dragged on and on. One person in the audience, his patience exhausted after about an hour, ventured the opinion that jazz should be heard, not defined—especially in view of the fact that a fine record collection had been brought that evening for that purpose. His remark was ignored, and the argument continued. After a considerable interval, he brought up his suggestion again, so that one side of one record was played, but the argument was resumed as soon as the record was finished. At the end of three hours, several hundred thousand words had been spoken in the attempt to arrive at the "true meaning" of the words "Jazz", but the *experience* of jazz had been limited to the playing of three sides! It was something like going to a dinner and being served two olives and a lecture on nutrition.

So deeply rooted is the assumption that words can be explained satisfactorily by more words that it usually come to us as a discovery, made relatively late in life, and even when made, not made use of, that it is impossible to give a man who has been blind from birth any notion of the color "red". Try to define the flavor of strawberries for someone who has never tasted them. Try to explain to someone who has never loved the meaning of "love", or to one who has never been at peace the meaning of "peace". Novelists, artists, and poets are always telling us, in one way or another, that the realities of living are *not* the definitions inside our heads. But do we in education or in ordinary social practice make use of this knowl-

edge? Are not our standard means of education, except in a few advanced schools, the pounding of definitions into students' heads and asking them to reproduce them in examinations? Ward heelers who could not at the point of a gun give definitions of terms like "citizenship", "franchise", "democracy", and "due process' are nevertheless able to carry precincts and win elections. There is a world of difference between facility at the verbal level and facility at the level of experience, summed up in the popular adage, "Those who can, do; those who cannot, teach".

MEANING AND BEHAVIOR

Semantics, then, does not deal with the "meanings of words" as that expression is commonly understood. We must follow rather P. W. Bridgman's advice in his book, *The Logic of Modern Physics:* "The true meaning of a term is to be found by observing what a man does with it, not by what he says about it". But we can go farther than Bridgman does. He made an enormous contribution to science by showing that the meaning of a scientific term lies in the *operations,* the things *done,* that establish, its validity, rather than in verbal definitions. But let us carry his suggestion outside the physical sciences and see what people do with both the language they use and the language people use at them. Here is a personnel manager studying an application blank. He comes to the words, "Education: Harvard University", and drops the application blank in the wastebasket because, as he would say if you asked him, "He doesn't like Harvard men". This is an instance of "meaning" at work—but it is not a meaning that can be found in dictionaries. Here is another person who, in Germany under Hitler, attends a Nazi rally and runs into the street to throw a brick into a Jewish merchant's window, in the belief that this act will somehow help in solving Germany's problems. Here is still another person who, hearing Orson Welles' radio drama in 1938 about an "army from Mars" landing in New Jersey, races to the recruiting station to join the fight against the Martians. Here is another person who insists on postponing the signing of a business contract until next week, because this week, according to the astrological magazine he reads regularly, is not a propitious one for business dealings.

If I seem to be taking a long time to explain what semantics is about, it is because I am trying, in the course of explanation, to introduce the reader to a certain way of looking at human behavior. Semantics is not any definition of the word "strawberry". In all the examples I have given, the reader will have noticed that I have been paying particular attention, not to words, but to *human conduct* as affected by, directed by, conditioned by words and other symbols. It is now safe, I trust, to give a definition, having adequately warned the reader that definitions are not to be taken too seriously. Semantics is the study of human *responses* to symbols, signs, symbol systems (including language), sign systems, and sign-situations. In other words, semantics is a study of how *human* nervous systems work.

I say human nervous systems because, so far as we know, human beings are the only creatures that have, over and above that biological equipment which we have in common with other creatures, the additional capacity for manufacturing symbols and systems of symbols. If, of course, it occurs in the future that dogs or chimpanzees develop the symbolic capacity, so that they begin to utter not simply sounds but *systems of sounds meaningfully interrelated,* so that they begin to accumulate historical traditions, folklore, systems of law, symbols of church and state, liturgical dramas, little theater movements, and pile up knowledge from generation to generation in what we call "science", then we would have to include the study of dog and chimpanzee symbolic systems in the field of semantics. At this date, however, our principal concern is still human behavior.

Now, a first important tenet of semantics is that the meaning of words (and other symbols) is not in the words, it is in us. If I were to tell a shockingly obscene story in Arabic or Hindustani or Swahili before an audience that understood only English, no one would blush or be angry; the story would be neither shock-

ing nor obscene—indeed, it would not even be a story, but only a set of meaningless noises. The reason I make myself understood to the reader at this moment is that the reader and I belong to the same linguistic community; that is, we have *inside our skins* similar ways of responding to the system of sounds (here represented by these black marks on paper) which we know as the English language.

Similarly, the meaning of any other symbol —a flag, a badge of military rank, a dollar bill —is not the symbol, but in us. We have been taught to respond to these symbols in certain ways. When we cease to respond to the dollar bill as we now do—when we refuse to accept it in exchange for goods and services—the dollar bill becomes meaningless. The meaning of a smile on another person's face, the meaning of a pair of scuffed shoes on a visitor's feet, the meaning of every little item in our environment, is likewise within us, not in the things as such. Hence, it is preferable to drop the word "meaning" wherever possible, especially the expression "the meaning of words", which seems to imply that the meanings are in the words. In semantics, we study not words as such, not signs or symbols as such, but human responses or *evaluations*.

IDENTIFICATION-REACTIONS

Now, no one can tell us *in advance* what the correct evaluations are of a given utterance, word, symbols, or sign that we are *going to* encounter. The fact that a Socialist has announced his candidacy for political office in our district at the next election, the fact that the streetcar men have announced a strike vote, the fact that one's wife announces that she is going to get a different style of hair-do, the fact that one's little boy comes home from school with a bleeding nose—all these events we shall have to evaluate in our own way, according to time, place and circumstances, and included among the circumstances will be our own stock of wishes, hopes, fears, and desires. But if it is possible to predict in advance of the event that we are ready to vote for *any* candidate so long as he bears the right party label, or to vote against *any* candidate no matter how good because he bears the wrong one; if we are ready to oppose or support) *any* strike, no matter who the people involved or what the circumstances; if we are ready to have tantrums about our wife's new hair-do *before* we have even seen it; if we *always* faint at the sight of blood; if, in other words, our reactions to certain words, signs, or situations are *completely* predictable; if we can be counted on to become apoplectic at the mere *mention* of the Democratic party; if we are certain to quarrel with *every* woman we go out with; if we are *certain* to remain silent (or to hog the conversation) at every party we go to, then, we can say with tolerable assurance that in our system of responses there is at least one area in which our brains simply don't work; there is an uninsulated spot which, when touched, immediately results in a short-circuit.

We may call such short circuited responses *identification reactions*. By calling them identifications, we point to the fact that a person given to such responses *identifies* (makes the same) all occurrences of a given symbol, so that he reacts with equal dislike to *all* Democrats, all Democratic proposals, all opposite proposals if they are also made by Democrats, the Democratic president's wife, children, and dog. Or he may identify all women as one woman and treat them all alike; or he may treat all social evenings as one and behave in exactly the same way at every gathering. If the reader will think back on all the cases of semantic malfunctioning mentioned earlier, he will find the term "identification reaction" applicable to all of them: where symbol is identified with reality; where the stereotyped "Jew" of Nazi propaganda is identified with the actual Jewish individual; where a verbal "invasion from Mars" is identified with an actual invasion.

Identification, then, as the great pioneer of semantics, Alfred Korzybski (1870-1950), said in his book, *Science and Sanity*, can be used as a general term describing the majority of cases of semantic malfunctioning. Identification goes on in the human nervous system; "out there" there are no absolute identities. No two Harvard men, no two Ford cars, no two mothers-in-law, no two "politicians", no two

leaves from the same tree, are identical with each other in all respects. If, however, we treat all cases that fall under the same class label, or at the subverbal level, all visual or social configurations that fall into the same pattern, as one, then there is something wrong with our patterns of response. "Identification" is, I believe, the most penetrating as well as the most general of all the diagnostic terms used by Korzybski in formulating in his book his system of "general semantics".

We are now ready, then, for another definition of semantics. It is a *comparative* study of the kinds of responses people make to the symbols and signs around them; we may compare the kinds of response-patterns common among the prejudiced, the foolish, and mentally ill with those whose response-patterns are such as to lead to the successful solving of problems, so that, if we care to, we may revise our own response-patterns for the better. In other words, semantics is, if we wish to make it so, the study of how not to be a damn fool.

THE HUMAN ENVIRONMENT

Identification reactions run all the way through nature. The capacity for seeing similarities is necessary to the survival of all animals. The pickerel, I suppose, identifies all shiny, fluttery things going through the water as minnows and goes after them all in pretty much the same way. Under natural conditions, life is made possible for the pickerel by this capacity. Once in a while, however, the shiny, fluttery thing in the water may happen not to be a minnow but an artificial lure on the end of a line. In such case, one would say that the identification response, so useful for survival, under somewhat more complex conditions that require *differentiation* between two sorts of shiny and fluttery objects, proves to be fatal. We may say, then that for purposes of survival in a world in which artificial lures are common, the pickerel would have to develop different responses to shiny flutter_1 and shiny flutter_2. And, returning to the chickens mentioned at the beginning, one could say that for purposes of survival, the chickens should have been able to distinguish between bell-when-market-quotations-on-fowl-are-high and bell-when-market-quotations-are-low.

To go back to our discussion of human behavior, we see at once that the problem of *adequate differentiation* is immeasurably more complex for men than it is for pickerels or chickens. The signs we respond to, and symbols we create and train ourselves to respond to, are infinitely greater in number and immeasurably more abstract than the signs in a pickerel's environment or a chicken's. Lower animals have only to deal with certain brute facts in their physical environment. But think, only for a moment, of what constitutes a human environment. Think of the items that call for adequate responses that no animal ever has to think about: our days are named and numbered, so that we have birthdays, anniversaries, holidays, centennials, and so on, all calling for specifically human responses; we have history, which no animal has to worry about; we have verbally codified patterns of behavior which we call legal, religious, and ethical systems; we have to respond not only to events in our immediate environment, but to *reported* events in Washington, Paris, Tokyo, Moscow; we have literature, comic strips, confession magazines, market quotations, detective stories, journals of abnormal psychology, bookkeeping systems; we have money, credit, banking, stocks, bonds, checks, bills; we have the vast symbolims of moving pictures, paintings, drama, music, architecture, and dress; in short, we live in a vast human dimension of which the lower animals have no inkling, and we have to have a capacity for differentiation adequate to the complexity of our extra environment.

SOURCES OF IDENTIFICATION-REACTIONS

The next question, then, is why human beings do not always have an adequate capacity for differentiation. Why are we not constantly on the lookout for differences as well as similarities instead of feeling, as so many do, that the Chinese (or Mexicans, or ballplayers, or woman drivers) are "all alike"? Why do some people react to words as if they were the things they stand for? Why do certain patterns of reaction, both in individuals and in larger

groups such as nations, persist long after the usefulness has expired? Where do we get these compulsive patterns of completely predictable uniformity of behavior that are so often ill-suited, and sometimes even suicidal, under change sets of circumstances?

Part of our identification reactions are due simply, as already indicated, to biological inheritance from earlier conditions under which they were necessary for survival. I was once beaten up and robbed by two men on a dark street. Months later, I was again on a dark street with two men, good friends of mine, but involuntarily I found myself in a panic and insisted on our hurrying to a well lighted drug-store to have a soda so that I would stop being jittery. In other words, my whole body reacted with an identification-reaction of fear of these two men, in spite of the fact that I "know" that I was not in danger. Fortunately, with the passage of time, this reaction has died away.

Now, as psychologists have told us, if terrible experiences happen, especially to a young child, identification-reactions can be set up in the child's nervous system, often to cause emotional difficulties in later life. According to the Freudian view, certain behavior disorders are caused by fear of all older men in positions of authority—in short, an identification-reaction. Psychotherapy can then be described as the breaking up of identifications, until the patient is convinced in his actions as well as in words that these older men are not his father, and also that his father is no longer the same person, any more than the patient is the same person, now that twenty or more years have passed since the onset of the original fear.

The Adlerian school of psychology attributes most misevaluations to feelings of inferiority and insecurity. Such misevaluations can also be described as identification-reactions. In some situations, we have reason to feel very much at ease; nevertheless, persons suffering from what is called "inferiority complex" feel inferior in *all* situations. Psycotherapy according to the Adlerians is again directed toward the breaking up of such identification-reactions, so that the patient is enabled to step forward when the situation requires that he step forward and to take a back seat when that is what the situation requires, instead of compulsively stepping forward and trying to be the center of attention all the time, or, on the other hand, hiding in a corner and trying to escape notice all the time.

SOCIETY AND SOCIAL PRESSURES

Further identification-reactions are caused, as any sociologist will agree, by communal patterns of behavior which were necessary or thought necessary at one stage or another in the development of a tribe or nation. General directives such as "Kill all snakes", "Never kill cows, which are sacred animals", "Shoot all strangers on sight", "Fall down flat on your face before all members of the aristocracy", or, to come to more modern instances, "Never vote for a Republican", "Oppose all government regulation of business", are undoubtedly an enormous factor in the creation of identification-reactions. Some human beings, possibly in their private feelings a majority, can accept these directives in a human way: that is, it will not be impossible for them under a sufficiently changed set of circumstances to kill a cow, or not to bow down before an aristocrat, or to vote for a Republican. Others, however, get these directives so deeply ground into their nervous systems that they become incapable of changing their responses no matter how greatly the circumstances may have changed. Still others, although capable of changing their responses, dare not do so for fear of public opinion. The goal of social therapy is again, like the other therapies I have mentioned, the breaking up of absolute identifications. Society must obviously have patterns of behavior; human beings must obviously have habits. But when those patterns become inflexible, so that a tribe has only one way to meet a famine, namely, to throw more infants as sacrifices to the crocodiles; or a nation has only one way to meet a threat to its security, namely, to increase its armaments, then such a tribe or such a nation is headed for trouble. There is insufficient capacity for differentiated behavior.

Furthermore—and here one must touch upon the role of newspapers and the radio—if cer-

tain propaganda agencies hammer away incessantly at the production of, let us say, a hostile set of reactions at such words as "bureaucrats", "Wall Street", "international bankers", "labor leaders", and so on, no matter how useful an immediate job they may perform in correcting a given abuse at a given time and place, they can in the long run produce in thousands of readers and listeners identification—reactions to these words—reactions that will make intelligent public discussion impossible. We all know the role of over-indoctrination, of over-sensitization to slogans, catchwords, and scare-words that dictators have used to bring themselves to power. We all know, too, how the larger part of the advertising profession is engaged in the creation of another kind of identification reaction, namely, the favorable response to *every* occurrence of the brand names they are paid to publicize. Modern means of mass communication and propaganda certainly have an important part to play in the creation of identification-reactions.

LINGUISTIC TRAPS

In addition to the foregoing, there is still another source of identification-reactions, namely, the language we use in our daily thought and speech. Unlike the languages of the sciences, which are carefully constructed, tailor-made, special purpose languages, the language of everyday life is one directly inherited and haphazardly developed from those of our prescientific ancestors: Anglo-Saxons, primitive Germanic tribes, primitive Indo-Europeans. with their scant knowledge of the world, they formulated descriptions of the world believe that the sun "rises". We do not today believe that the sun "rises". Nevertheless, we still continue to use the expression, *without believing what we say.*

But there are other expressions, quite as primitive as the idea of "sunrise", which we use uncritically, fully believing in the implications of our terms. We may make an observation, for example, that "Negroes are lazy". Apart from the truth or falsity of the generalization, let us examine for a moment the implications of the statement as it is ordinarily constructed: "Negroes are lazy". The statement implies, as "common sense" and any textbook on traditional logic tells us, that "laziness" is a "quality" that is "inherent" in Negroes. What are the facts? Under conditions of slavery, where one doesn't get paid for working, and under later conditions, where even if one works hard the chances of advancement are nil, there isn't any point in being an industrious and responsible worker. The distinguished French abstract artist, Jean Hélion, told in a lecture in Chicago the story of his life as a prisoner in a German camp, where, during the Second World War, he was compelled to do forced labor. He told how he loafed on the job, how he thought of device after device for avoiding work and producing as little as possible, how he stole chickens at every opportunity—and, since his prison camp was also a farm—how he put on an expression of good natured imbecility whenever approached by his Nazi overseers. Without intending to do so, in describing his own actions, he gave an almost perfect picture of the literary type of the Southern Negro of slavery days. "Laziness", then, is not an "inherent quality"—it is a response to a work situation in which there are no rewards for working and in which one resents his taskmasters. The statement "Negroes are lazy" is, therefore, the crudest kind of observation based on an out-of-date way of saying things like "The sun rises". Even if the majority of Negroes were averse to working (which, of course, is far from being the case—in the industrial North especially they work as frantically and compulsively as white people do), the statement would still be entirely misleading, since it implies a theory of "inherent characteristics" that modern science has found to be mistaken. The tragedy is not simply the fact that people make such statements; the graver fact is that they believe themselves when they make them.

"CALLING A SPADE A SPADE"

Some individuals are admired for their "realism" because, as the saying goes, they "call a spade a spade". Suppose we were to raise the question, "Why should anyone call it a spade?"

The reply would obviously be, "Because that's what it *is*!" This reply appeals so strongly to the common sense of most people, that they feel that at this point discussion can be closed. I should like to ask the reader, however, to consider a point which may appear at first to him a mere quibble.

Here, let us say, is an implement for digging made of steel, with a wooden handle. Here, on the other hand, is a succession of sounds made with the tongue, lips, and vocal cords: "spade". If you want a digging implement of the kind we are talking about, you would ask for it by making the succession of sounds, "spade", *if you are addressing an English speaking person.* But suppose you were addressing a speaker of Dutch, French, Hungarian, Chinese, Tagalog? Would you not have to make completely different sounds? It is apparent, then, that the "common sense" opinion of most people, "We call a spade a spade because that's what it is", is completely and utterly wrong. We call it a "spade" because we are English speaking people, conforming, in this instance, to majority usage in naming this particular object. The steel and iron digging implement is simply an object standing there against the garage door; "spade" is what we *call* it—"spade" is a *name.*

And here we come to another source of identification-reactions—an unconscious assumption about language epitomized in the expression "a spade is a spade", or even more elegantly in the famous remark, "Pigs are called pigs because they are such dirty animals". The assumption is that everything has a "right name" and that the "right name" names the "essence" of that which is named.

If this assumption is at work in our reaction-patterns, we are likely to be given to premature and often extremely inappropriate responses. *We are likely to react to names as if they gave complete insight into the persons, things, or situations named.* If we are told that a given individual is a "Jew", we are likely to respond, "That's all I need to know". For, if names give the "essence" of that which is named, obviously, every "Jew" has the "essental attribute" of "Jewishness". Or, to put it the other way around, it is because he possesses "Jewishness" that we call him a "Jew"! A further example of the operation of this assumption is that, in spite of the fact that my entire education has been in Canada and the United States, I am sometimes credited, or accused, *on the basis of my name,* of having an "Oriental mind." Now, since Buddha, Confucius, General Tojo, Mao Tse-Tung, Syngham Rhee, Pandit Nehru, and proprietor of the Gold Pheasant Chop Suey House all have "Oriental minds", it is hard to imagine what is meant. The "Oriental mind", like the "attribute" of Jewishness", is purely and simply a fiction. Nevertheless, it is to be noted that newspaper columnists get paid for articles that purport to account for Stalin's behavior by pointing out that since he comes from Georgia, which is next to Turkey and Azerbajian and therefore "more a part of Asia than of Europe", he too has an "Oriental mind".

Our everyday habits of speech and our unconscious assumptions about the relations between words and things lead, then, to an identification-reaction in which it is felt that *all things that have the same name are entitled to the same response.* From this point of view, *all* "insurance men", or "college boys", or politicians", or "lawyers", or "Texans" *are alike.* Once we recognize the absurdity of these identification-reactions based on identities of name, we can begin to think more clearly and more adequately. No "Texan" is *exactly* like any other "Texan". No "college boy" is *exactly* like any other "college boy." To react in *exactly* the same way to every occurrence of certain words—whatever the particular words may be—is to be like the chickens as the beginning of this essay. *Most* of the time "Texans" or "college boys" *may* be what you think they are, but *often they are not.* To realize fully the difference between words and what they stand for is to be ready *for differences as well as similarities* in the world. This readiness is mandatory to scientific thinking, as well as to sane thinking.

Korzybski's simple but powerful suggestion to those wishing to reduce identification-reactions in their thinking is to add "index-numbers" to all terms, according to the formula: $A_1 + A_2$. Translated into everday language we can state the formula in such terms as these:

Cow_1 is not cow_2; cow_2 is now cow_3. . . . $Texan_1$ is not $Texan_2$. . . . $politician_1$ is not $politician_2$. . . . ham and eggs (Plaza Hotel) are not ham and eggs (Smitty's Cafe). . . . socialism (Russia) is not socialism (England) . . . private enterprise (Joe's Shoe Repair Shop) is not private enterprise (A. T. & T.). . . . The formula means that instead of simply thinking about "cows" or "private enterprise", we also think as factually as possible about the differences between one cow and another, one politician and another, one privately owned enterprise and another.

This device of "indexing" will not automatically make us wiser and better, but it's a start. When we talk or write, the habit of indexing our general terms will reduce our tendency to wild and woolly generalization. It will compel us to think before we speak—think in terms of concrete objects and events and situations, rather than in terms of verbal associations. When we read or listen the habit of indexing will help us visualize more concretely, and therefore understand better, what is being said. And if nothing is being said except deceptive windbaggery, the habit of indexing may—at least part of the time—save us from behaving like the chickens at the beginning of this essay.

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PROQUE NOS NON COMPORTA NOS COMO HUMANOS

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SUMMARIO IN INTERLINGUA

Le producto final del education, le vostre e le mie e illo de omne le mundo, es le configuration total de reactiones o de reactiones potential que nos ha intra nostre pelles. Ille configuration nos ha con nos a omne tempore e in omne loco. Illo determina le maniera in que ie lector interpreta (o misinterpreta) iste parolas a iste momento mesme. Certe lectores, a causa de lor configurationes habitual de reaction, legera iste parolas solmente pro cercar errores o misconstatationes a fin que illes pote disputar mi observationes. Altere lectores, etiam a causa le lor configurationes habitual de reaction, credera omne cosa que io dice proque illo es imprimite; lor education les ha inspirate con le credentia que omne cosa imprimite (non importa ubi) es ver. Si deman in un altere texto illes lege le opposito de mi opinion, illes lo credera etiam. Altere lectores—e io spera que istes constitue un majoritate—legera attentemente, tentante comprender lo que io dice e etiam le motivos que impelle me a dicer lo; illes va suspender lor reactiones, e alora deman, o in duo septimanas, post haber controlate mi parolas contra lor memoria e lor experientia e lor matur reflexiones, illes decidera si o non iste essayo esseva bon.

Ora, un doctrina importantissime del semantica es que le signification de parolas (e de altere symbolos) non es in le parolas; illo es in nos. Si io narrava un historia obscenissime in arabe, o hindustani, o swahili ante un auditorio que comprende solmente anglese, mulle persona rubescerea o se incholerisarea. Le historia non esserea chocante o obscen; de facto, illo non esserea un historia sed solmente un sequentia de ruitos sin signification. Le ration proque io pote facer me comprender per le lector a iste momento es que le lector e io pertine al mesme communitate linguistic; illo es, nos ha intra nos simile manieras de responder al systema de sonos (hic representate per iste nigre marcas super le papiro) que nos appella le lingua anglese.

Le question sequente, ora, es proque humanos non semper ha un capacitate adequate pro le differentiation. Proque cerca nos non constantemente le differentias inter le cosas si ben como lor similaritates, in vice de sentir, como lo face tante personas, que le chineses (o le mexicanos, o le

jocatores de baseball, o le automobilistas feminin) es "omnes identic?" Proque alicun personas reage a parolas como si illos esseva le cosas que illos indica? Proque persiste certe configurationes de reaction, tanto in individuos como etiam in plus grande gruppos como per exemplo nationes, longemente post que lor utilitate ha expirate? Ubi recipe nos iste configurationes compulsive de uniformitate de comportamento, completemente predicibile, le quales es si frequentemente maladaptate, e a vices mesmo suicidal, sub altere circumstantias?

A parte iste considerationes, il existe ancora un altere fonte de reactiones de identification, a saper, le lingua que nos utilisa in nostre pensar e parlar quotidian. Per constrasto con le linguas del scientias, le quales es attentemente construite e adaptate a lor objectivos special, le lingua del vita quotidian es directemente hereditate e disveloppate al hasardo ab le linguas de nostre ancestres prescientific: anglosaxones, primitive tribos germanic, primitive indoeuropeos. Con lor pauc cognoscentias del mundo illes formulava descriptiones de illo. Illes credeva que le sol "se leva." Hodie nos non crede que le sol "se leva." Nonobstante nos continua usar le expression sin creder lo que nos dice.

AMERICAN ACADEMY OF DENTAL MEDICINE ANNOUNCES MID-ANNUAL MEETING

The American Academy of Dental Medicine will hold its Mid-Annual Meeting in New York City at Hotel Sheraton-McAlpin, on Sunday, December 6, 1959. A business meeting for delegates and members will be held at 10:00 A.M., followed by a luncheon at 12:30 P.M.

Dentists and physicians will convene from all parts of the United States as well as from Europe and the Latin American countries.

A scientific program will be conducted from 2:00 to 5:00 P.M., featuring presentations on oral rehabilitation and the gingival tissue by essayists and clinicians well qualified in the field of dental medicine.

All members of the Academy and other interested dentists and physicians are welcome to attend. For program and reservations address Dr. Andrew J. Cannistraci, 2152 Muliner Avenue, New York 62, N. Y.

METHOCARBAMAL (ROBAXIN) AS AN ADJUNCT IN THE TREATMENT OF BRUXISM

ABRAM I. CHASINS, D.D.S., F.A.C.D.*

Bruxism, the clenching or grinding of the teeth either by day or while asleep, has a damaging influence on the teeth and their supporting tissues. Bruxism is used in its broad sense to mean both grinding and clenching habits while awake or asleep. Miller[1] states that bruxism may cause accentuated alveolar bone destruction. Ingersoll and Kerens[2] felt that periodontal therapy frequently fails when the patient continues a persistant traumatizing of the periodontal tissues.

Autosuggestion, psychotherapy and a wide variety of splints, night guards and other mechanical aids have been used in an attempt to control bruxism and its effect on the periodontium.

Tishler[3] states that the inception of a habit neurosis is due to some unusual, self discovered condition which attracts and excites a susceptable individual, causing him to direct his conscious or subconscious attention to it. Since bruxism is so universal a habit, it would seem that a great percentage of the population is susceptable to habit neurosis in one form or another and that a more logical approach to the problem would be the discovery and elimination of the exciting cause or causes.

It has been the author's experience that occlusal disharmonies and periodontal disease were the most common exciting factors responsible for initiating and perpetuating the grinding and clenching habits. In most instances the correction of these factors eliminated the habit. Where the habit still persisted it was found that it had been moderated and that the forces of bruxism had been made innocuous by the elimination of the occlusal disharmonies and the periodontal disease.

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Attempts have been made to control the habit of bruxism by the use of drugs. Goldstein[4] reported relief from bruxism with a mephensin compound, although he found that extended use of the drug was necessary for effective control. No mention was made of any concommitant corrective therapy. A variety of tranquilizer-like drugs have also been used in an attempt to control bruxism. When they were used without corrective therapy, withdrawal of the drugs resulted in the return of bruxism.

A new agent, methocarbamol, has recently become available. It has been well documented in medical literature[5, 6, 7, 8] as an effective, safe muscle relaxant. These reports implied that methocarbamol might have a place in the control of bruxism. I, therefore, engaged in a clinical study to ascertain the efficacy of methocarbamol in alleviating this condition, as an adjunct to periodontal therapy and correction of occlusal disharmonies. The study was expected to furnish pertinent information on three basic premises: (1) That relaxation of muscles of mastication would reduce the traumatogenic effect of bruxism on the periodontal tissues, permitting more effective periodontal therapy and shortening the treatment and healing period; (2) That patients would be more cooperative while the occlusion was being equilibrated; and (3) That if the habit pattern could be interrupted while the causes were being eliminated, the habit would probably not return upon withdrawal of the drug.

PHARMACOLOGY

Methocarbamol (robaxin) is 3-(o-methoxyphenoxy)-2-hydroxypropyl carbamate. It is a new compound synthesized in 1953 by Murphey. Its mode of action is a prolonged blocking activity on the motor synaptic reflexes. Methocarbamol does not act directly on the

contractile mechanism (striated muscles), the motor end-plate, or the nerve fiber. It has, therefore, the advantage of interrupting the mechanism that produces spasm without producing weakness, paralysis, or loss of voluntary usage. Through both animal toxicity studies and a large number of clinical trials, the drug has been virtually free of adverse side effects.

METHOD

A. Patients

Eighty patients were chosen and divided into two equal groups. Group A received methocarbamol for a period of one to two weeks before and two to four weeks during the initial period of actual treatment for periodontal disease. Group B served as a control group, being treated periodontally without adjunctive drug therapy.

The patients ranged from twenty-five (25) to fifty-nine (59) years of age with an average age of thirty-eight (38) years. There were 17 men and 23 women in group A and 15 men and 25 women in Group B.

Many of the patients were aware of their habits of bruxism, but some were aware only of the resultant symptoms, such as tired, aching muscles, losseness of teeth, and numbness or a dull ache in the teeth. Since the patients' own conscious reaction would be important in the evaluation of results, all patients were made definitely aware of the presence of the habit prior to the study.

B. Criteria for Evaluation

In appraising each patient's response every effort was made to be as objective as possible. Of necessity much depended on clinical judgment based on past experience in treating these cases. The results were evaluated on the following basis:

(1) The effect of methocarbamol therapy after one week and after two weeks before beginning active periodontal therapy. (Group A)

(2) The results of one week of methocarbamol therapy and the effect of withdrawal for one week before starting periodontal therapy. (Group A)

(3) The effect of methocarbamol therapy during the corrective procedures, i.e., scaling the teeth, instructions in home care, and equilibration of the occlusion. (Group A compared to Group B)

(4) Comparison of the results of the two groups after completing periodontal therapy and restoring a functional occlusion.

C. Dosage and Administration

Methocarbamol was supplied in 500 mg. scored tablets. The average dose used was one gram (two tablets) at bedtime for those patients who manifested bruxism while asleep. Those patients who clenched their teeth while awake were given four grams in divided doses (2 tablets after each meal and 2 at bedtime). Although larger doses of methocarbamol are recommended for treatment of acute muscle spasm and trismus, smaller doses were considered adequate for bruxism.

D. Procedure

Before effective periodontal therapy could be started on any patient, there was a period of one to two weeks during which the necessary diagnostic procedures, case evaluation, and treatment plan were completed. Thus, a time was available in which the effect of methocarbamol therapy could be observed before any of the probable exciting causes of bruxism would be eliminated. Patients in both groups were given similar treatment on a similar time schedule except that Group A received methocarbamol as outlined in the dosage schedule. Of the patients in Group A six (6) received sufficient relief during the first week to stop at that point and await active therapy. All but one of the remaining thirty-four (34) patients continued methocarbamol during both weeks of appraisel; the thirty-fourth claimed that she became too relaxed and limp to continue drug therapy. She was dropped at that point from the study.

When active therapy began, Group A consisted of thirty-nine (39) patients. They continued with methocarbamol during the two to four weeks required for that part of active periodontal treatment, which included scaling the teeth, instructions in proper home care, and selective grinding until the occlusion was equi-

librated. The drug was then withdrawn until periodontal therapy was completed.

Group B patients followed the same routine except for three who were unable to registar the correct mandibular movement during the selective grinding procedure. These patients were given one gram (2 tablets) of methocarbamol, administered one hour before the office visit; they were then able to cooperate.

All patients were evaluated after completion of periodontal therapy, which included the eradication of the periodontal pocket by whatever means was indicated, and a final recheck of the occlusion. When the periodontal condition was under control the questionable teeth were re-evaluated, and the missing teeth replaced, restoring form and function as nearly ideally as possible. In some instances, because of the financial status of the patient or the inability of the dentist to carry out the prescribed prosthesis, some compromise in this ideal situation had to be made. Although multiple fixed units were prescribed for many patients, complete fixation in one or both arches was not indicated in any of them.

During the period following surgery, several patients became aware that they were clenching and grinding their teeth again while wearing a periodontal pack. Whenever this occured with Group A patients, the medication, consisting of one (1) gram of methocarbamol after each meal and at bedtime, was reinstituted for a two week period. Later this medication schedule was prescribed for those patients who could not satisfactorily adjust to insertion of prosthetic replacements.

RESULTS

Pre-Treatment period

At the end of two weeks of drug therapy, 17 patients were entirely free of all symptoms of bruxism; 10 experienced partial improvement. No change was noted by 6 patients. In addition to the 17 patients who were asymptomatic, there were 6 who were free of bruxism at the end of the first week. The medication was then withheld from these 6 patients the second week, and 5 had a return of all symptoms and 1 had a partial recurrence.

TABLE I

EFFECT OF METHOCARBAMOL ON BRUXISM

		Pre-Treatment Period			following scaling and equilibration		
	Total	*No Symptoms*	*Improved*	*No Change*	*No Symptoms*	*Improved*	*No Change*
Group A (Treated Group)	40*	23	10	6	33	6	0
Group B (Control Group)	40	0	9	31	23	17	0

* One patient discontinued drug—too relaxed and limp

TREATMENT PERIOD

During the initial period of active periodontal treatment (two to four weeks) thirty-three (33) of thirty-nine (39) Group A patients claimed they were no longer clenching or grinding their teeth. Six (6) patients stated that they had some improvement. In the control Group B twenty-three (23) patients felt that they were not clenching or grinding, while seventeen (17) had an occasional remission during times of tension or when overly tired. Patients receiving methocarbamol were much more relaxed and cooperative during the selective grinding procedure.

POST-SURGICAL AND RESTORATIVE PERIOD

During the period following surgery, several patients became aware of moderate bruxism. In Group A this was completely controlled by prescribing one gram of methocarbamol after each meal and at bedtime. When it occured in Group B, there appeared to be a greater sensitivity to thermal change, and the mobility of the teeth persisted for a longer period of time than in Group A. In the patients requiring prosthetic replacements following treatment, there were three (3) cases in which symptoms of bruxism returned following the insertion of these appliances. After one week of methocarbamol therapy, these patients adjusted to the restorations and required no further medication (even following withdrawal of the drug).

FINAL RESULTS

At discharge thirty-four (34) patients in Group A were no longer manifesting bruxism while five (5) were improved. In Group B thirty-three (33) patients had complete remission of the habit, and seven (7) patients still ground and clenched their teeth when tired or upset. With methocarbamol therapy, night guards and other mechanical appliances were unnecessary to control the habit of bruxism. In all cases treated, very satisfactory results were obtained after returning periodontal tissues to a state of health and after restoring good function.

TABLE II

FINAL RESULT OF CORRECTIVE THERAPY IN 79 CASES OF BRUXISM

	No. Patients	*Stopped*	*Improved*	*No Change*
Treated Group A	39	34 (87%)	5	0
Control Group B	40	33 (80%)	7	0

DISCUSSION

My experience has been that occlusal disharmonies and periodontal disease are the most common exciting factors responsible for starting and continuing bruxism. In most instances the correction of these factors eliminates the habit, but when the habit still persists after correction it usually is less severe than before.

In all patients selected for this study bruxism was one of the etiological factors responsible for the periodontal breakdown. Previous workers who have used drug therapy for control of this situation without corrective procedures have also noted that on cessation of therapy the habit returns. This is true of the series of six (6) cases in this study, five (5) of whom, after having had satisfactory relief from the habit, found that it returned upon withdrawal of the drug. The other patient had partial remission. While the final results in Groups A and B were not obviously different, methocarbamol was of definite value in Group A, because it helped significantly to control the habit and allay patient discomfort both before and during treatment. It also produced a more cooperative, relaxed patient, thereby reducing the duration of treatment as well as eliminating further trauma and damage during the period of corrective therapy. In the twelve (12) cases in which the habit persisted, the forces of occlusion did not appear sufficient to produce any further periodontal breakdown following corrective therapy.

SUMMARY

(1) In a clinical study of 80 patients with bruxism, one half were treated with methocarbamol prior to corrective therapy and the others served as a control group receiving periodontal therapy without drug.

(2) Good control and improvement of the bruxism habit was observed in 85% of the group receiving medication preceeding therapy.

(3) No change in the habit pattern was observed in the control group during the pretreatment period. While the end results of corrective therapy in the two groups were apparently the same the patients receiving methocarbamol, prior to and during therapy were more cooperative and required a shorter duration of corrective measures.

(4) One patient felt too limp and relaxed and discontinued drug treatment. No side effects were noted in any other patients receiving methocarbamol.

(5) When bruxism habit persisted in patients receiving methocarbamol, the force of occlusion did not appear sufficient to produce any further periodontal breakdown. This medication was found effective in controlling the habit of bruxism when it recurred following periodontal surgery or upon insertion of prosthetic replacements.

CONCLUSIONS

Methocarbamol (Robaxin is an effective medication for the control of the bruxism habit.

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Methocarbamol (Robaxin) was supplied for this investigation by the A. H. Robbins Company, Richmond, Virginia.

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METHOCARBAMAL (ROBAXINA) COMO ADJUNCTO IN LE TRACTAMENTO DE BRUXISMO

Dr. chir. dent. Abram I. Chasins (F.A.C.D.)

SUMMARIO IN INTERLINGUA

1. In un studio clinic de 80 patientes con bruxismo, un medietate esseva tractate con methocarbamol ante therapia corrective, le altere serviva de controlo, recipiente therapia periodontal sin droga.

2. Un bon regulation e melioration del habito de bruxismo esseva observate in 85 pro cento del gruppo que habeva recipite le medication ante le therapia.

3. Nulle cambiamento in le habitudes esseva observate in le gruppo de controlo durante le periodo ante le tractamento. Durante que le resultatos final del therapia corrective in le duo gruppos esseva apparentemente le mesme, le patientes qui habeva recipite methocarbamol ante e durante le therapia esseva plus cooperative, e illes requireva un plus breve duration del mesuras corrective.

4. Un patiente se sentiva troppo lasse e relaxate, e ille discontinuava le tractamento con le droga. Nulle effectos lateral esseva observate in ulle altere patiente qui recipeva methocarbamol.

5. Quando le habito de bruxismo persisteva in patientes recipiente methocarbamol, le fortia de occlusion non pareva sufficiente a producer ulle collapso periodontal additional. Iste medication se monstrava efficace in supprimer le habito de bruxismo quando illo recurreva post le chirurgia periodontal o post le insertion de reimplaciamentos prosthetic.

A PRELIMINARY EVALUATION OF THE USE OF CORTICOIDS IN MAJOR ORAL SURGICAL PROCEDURES AND NASO-TRACHEAL INTUBATIONS PRIOR TO GENERAL ANESTHESIA

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THE STEROIDS

The adrenal glands, especially, the outer layer or cortex, produce potent hormones, all of which are essential to life. These hormones are steroid derivatives, having well defined influences on the metabolism of electrolytes and thus on water metabolism, and on the metabolism of protein, carbohydrate, and fat. Other physiological functions have been attributed to the steroids, namely:

1. The modification of various diseases by treatment with cortisone or by injection of adrenocorticotrophic hormone of the pituitary (corticotrophin, ACTH), which increases the production of corticosteroids by the intact adrenal. Such a collagen disease as rheumatoid arthritis is an outstanding example.

2. The steroids also modify cellular response to disease, namely, the reaction of the body to to disease, namely, the reaction of the body to infection and allergic states (antibody response).[1]

THE CORTICOIDS

In recent years the corticoid hormones have been synthesized and found to be more potent than the actual hormones, with more specificity in their actions. The introduction of a double bond between carbon atoms one and two results in the production of cortisone and hydrocortisone analogues which are relatively inert as far as salt retaining properties are concerned, but retain the anti-inflammatory activity of the natural steroids. The cortisone analogue is known as prednisone (Meticorten®); the hydrocortisone analogue is prednisolone (Meticortelone®).[1]

Prednisone is $\Delta^{1,4}$—pregnodiene—17α, 21-dial 3, 11, 20—trione and is produced by dehydrogenation at positions one and two of the cortisone nucleus, which results in the following structural formula:

Prednisolone acetate is produced by the addition of the second double bond in the A-ring of hydrocortisone.

PREDNISOLONE ACETATE

Prednisolone acetate has been injected into joint spaces in arthritic conditions or acute bursal sacs in post traumatic bursitis. Results have been that of relief from pain and stiffness, generally occurring within 24 hours. Prednisone has been used successfully alone and in conjunction with antihistamines to control the exudative and inflammatory phases of ocular disorders, allergic or inflammatory conditions such as severe hay fever, asthma, eczema, drug reactions, and serum sickness.

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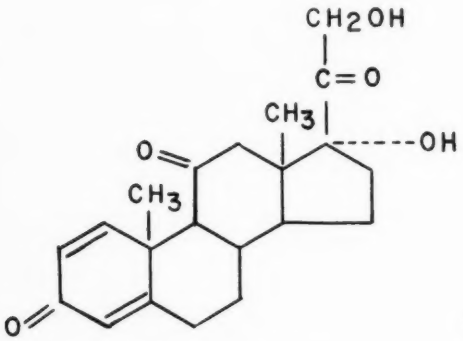

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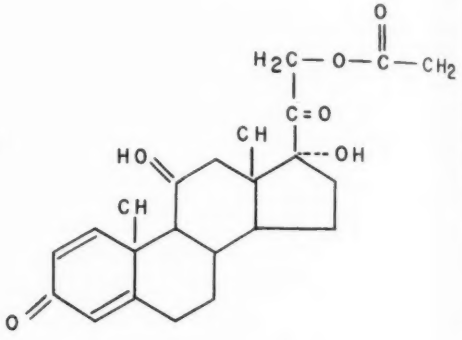

PREDNISOLONE ACETATE

THE HISTORY OF STEROIDS AND CORTICOIDS IN DENTISTRY

The dental literature has been increasing constantly with examples of the use of corticosteroids or their synthetic analogues in the control of excessive inflammatory reactions and as an increment to better healing of surgical sites. In 1953, Shafer reported on the effect of cortisone on the healing of extraction wounds in the rat.[2] He reported no evidence of retardation of the healing process until the 10th day, when lack of maturation of granulation tissue and lack of re-epithelization was noted. (Authors' note: The corticoids have been suggested as influential in better healing of surgical sites, whereas the natural steroids have been observed to deter normal healing. Shafer also observed that new bone formation in the sockets of the subjects was not interfered with through the experiment).

In June 1954, the Council on Dental Therapeutics of the American Dental Association placed hydrocortisone acetate saline suspension under Group B of their classification of products by the Council on Dental Therapeutics. This meant the hydrocortisone was recognized as a drug of reasonable usefulness and safety, but with insufficient evidences to justify its complete acceptance by the Council. The Council recommended that the drug be used only when a diagnosis of rheumatoid arthritis with osteoarthritis was established. For the treatment of the temporal mandibular joint involved with rheumatoid arthritis, the injection of 5 to 10 mg. of the drug was found to relieve pain and improve mandibular movement.

Douglas and Kresberg[4] reviewed the status of cortisone in dentistry. The adrenocorticotrophic hormone and hydrocortisone were used by numerous investigators. The following disease entities were treated with either agent:

1. Arthritis and joint paracentesis
2. "Oral disease" due to local causes
3. Sjögren's disease
4. Gingivitis (subgingival and intermuscular injection of cortisone)
5. Temporal mandibular arthralgia
6. Facial neuralgia
7. Prevention of recurrance of dilantin hyperplasia
8. Angular cheilosis
9. Apical periodontitis
10. Lupus erythematosis with desquamative gingivitis
11. Bell's palsy
12. As an adjunct drug in immediate denture surgery

Their conclusion after reviewing the literature was that hydrocortisone has proved effective in dental and systemic diseases having dental implications.

Secondly, when cortisone is used in the pres-

ence of infection, appropriate antibiotic therapy should supplement hormonal treatment.

PRELIMINARY STUDY

Since prednisone and prednisolone acetate differ notably from cortisone and hydrocortisone in that sodium retention, edema and potassium loss occur less frequently, it was decided to evaluate the beneficial aspects of these agents in major oral surgical procedures. The study has been designed to evaluate:

1. The control of the exudative and inflammatory phases of oral surgery.
2. The alleviation of pain.
3. The control of hemorrhage.
4. The control of allergic manifestations.

A. Total number patients participating in preliminary study 68

B. Patients serving as controls 10

C. General diagnostic evaluation of patients participating in project.
   1. Generalized psoriasis
   2. Oral pathology (surgical or dental medicine)
   3. Hemiplegia
   4. Dermatitis rosacea
   5. Neuro psychiatric disturbances
   6. Basal cell carcinoma
   7. Post pneumonias
   8. Liver disease
   9. Arteriosclerotic heart disease
   10. Cardiac pathology

D. Types of oral surgical procdures performed

	Total Patient
1. Odontectomies:	
a) Single Impactions	9
b) Bilateral Impactions	5
2. Cysts of mandible	3
3. Exodontia Carious teeth—including multiple numbers	21
4. Fractures:	
a) Unilateral Fx. Mandible	3
b) Bilateral Fx. Mandible	2
c) Open reduction, unilateral and bilateral	3
5. Pericoronitis	1
6. Post operative pain and swelling —surgery performed elsewhere	1
7. Ameloblastoma—post surgery	1
8. Apicoectomy	3
9. Cysts of the palate	1
10. Papilloma—post surgical	1
11. Biopsy—post surgical	4
12. Surgical removal (flap procedure) carious teeth	5
13. Caldwell-Luc procedures (maxillary antrum)	1
14. Alveolectomy—maxillary, mandibular	2
15. Reattachment of muscle, buccal folds—maxillary and mandibular	1
16. Transplantation—third molar	1
17. Immediate dentures—full mouth exodontia	3

E. Number of patients undergoing general anesthesia with naso tracheal intubation.....21

F. Anesthesia
   a. Local: (1) Xylocaine 2% with Epinephrine 1/100,000
      (2) Procaine HCl 2% with Epinephrine 1/100,000
   b. General: (1) Pentothal Sodium—2.5%
      (2) N_2O and O_2
      (3) Cyclopropane
      (4) Ether as adjunct
   c. Adjunct fluids—5% dextrose in water for general anesthesia—1.5 hours

G. Medications—other than for investigation, encountered in study group
   1. Digoxin
   2. Equanil
   3. Phenobarbital
   4. Aminophylline
   5. Benadryl
   6. Trimeton
   7. Mercurhydrin
   8. Morphine Sulfate
   9. Codeine Sulfate
   10. Nitroglycerine
   11. Antibiotics used in project:
      a. (1) Crysticillin—600,000 u. O.D.
         (2) Terramycin HCl—250 mg.—1000 mg./Day
      b. Topical—Bacitracin Irrigations.
   12. Chlorpromazine
   13. Topical Steroids

H. Corticosteroid therapy

	Average Dosage	Maximum Dosage	Total Maximum Days	Total Maximum Total Dosage
1. Metreton	10 mg./Day	20 mg./Day	5	50-100 mg.
2. Meticortelone	25 mg./(c.c.)Day	50 mg./(c.c.)Day	5	150 mg.
3. Meticorten	15 mg./Day	30 mg./Day	5	250 mg.

I. Procedure

1. Age range—19 years to 67 years of age.
2. Placebos were used for the control group, consisting of ten patients.
3. The study was conducted at the Oral Surgery Section of the Veterans Administration Hospital Dental Service, New York 10, New York.
4. The age range of the patients began at 19 years and reached 67 years. The patients consisted entirely of male veterans. This fact is incidental, since it is perceived that results would have not differed extensively in a female patient group. Placebos were used for the control group, consisting of ten patients.

   The following laboratory studies were made:

   1. Each day of dosage the patients blood pressure was taken. On the whole these remained constant for each patient.
   2. Eosinophil counts were taken preoperatively and on the last day of steroid medication. Generally, these were found to be lower in value than the initial count without steroid therapy.
   3. The urine analysis for the patients were found to have no significant changes as compared to analysis before medication.

J. Results

1. There was no dramatic diminution of edema or trismus, in terms of duration or intensity, as compared with the observers' previous clinical experiences. This was of special interest in the case of open reductions for fractures of the mandible where moderate to severe edema is encountered and where favorable results can be very positive.
2. The several agents used did not appear to change the clinical results. This also infers that the mode of administration was not significant.
3. There was no appreciative lessening in degree of pain experienced by the group of patients involved.
4. There were no observed or reported incidents of untoward reactions.
5. There was no incidence of poor wound healing which could have been attributed to the administration of steroids.
6. Naso-tracheal intubations—There was no apparent change in the post-operative conditions of patients undergoing this technique prior to oral surgical procedures.

SUMMARY

1. It is felt that for the first portion of the investigation, too low a dosage was prescribed of each agent, possibly resulting in negligible responses. The later increase in dosage may still have been too low to stimulate favorable responses.
2. It will be necessary to continue the project with the steroids alone, to evaluate their trule role in edema and trismus. Since all patients receive antibiotics, the place of steroids post-operatively is obscure at this time.
3. To eliminate subjective interference with evaluation, the project will be limited to fewer procedures. Whenever possible the cases should be in the realm of major oral surgery and the condition bilateral with the same patient.
4. Any patient who is considered for corticosteroid therapy should have a com-

plete history evaluation in order to avoid conflict with previous or existing therapies.

5. Blind naso-tracheal procedures, although traumatic at times, usually leave the patient with little more than a slight tracheitis. Since no edema is normally encountered, the role of the steroids in this type of procedure should be further investigated. In one instant a patient underwent unsuccessful attempts at intubation for one hour. He had received Meticorten therapy two days prior to the procedure—the total dosage being 30 mg. Post-operatively there were no complaints other than a slight hoarseness of voice, which lasted for several days.
6. Discoloration of tissues was entirely absent in all cases treated.

Note: Further studies are in progress at this time in conjunction with major oral surgical procedures.

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UN EVALUTATION PRELIMINAR DEL USO DE CORTICOIDES IN MAJOR INTERVENTIONES DE CHIRURGIA ORAL E IN INTUBATIONES NASO-TRACHEAL ANTE LE USO DE ANESTHESIA GENERAL

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SUMMARIO IN INTERLINGUA

1. Es opinate que durante le prime parte del investigation un dosage troppo basse de cata agente esseva prescribite, possibilemente resultante in responsas negligible. Le subsequente augmento in le dosage possibilemente esseva ancora troppo basse pro stimular responsas favorabile.

2. Il essera necessari continuar le projecto con le steroides sol pro evalutar lo ver rolo in edema e trismo. Proque omne le patientes recipe antibioticos, le rolo postoperatori del steroides es obscur a iste tempore.

3. Pro eliminar disturbationes subjective del evalutation, le projecto va esser restringite a un plus limitate numero de procedimentos. Quandocunque possibile, le casos debe esser in le campo de major chirurgia oral e le condition bilateral con le mesme patiente.

4. Omne patiente considerate como candidato pro therapia a corticosteroides debe haber un complete evalutation de su historia a fin de evitar conflictos con previe e currente therapias.

5. Procedimentos naso-tracheal cec, ben que a vices traumatic, es generalmente sequite per nihil pejor que un leve tracheitis. Porque normalmente nulle edema es incontrate, le rolo del steroides in iste typo de procedimento debe reciper investigationes additional. In un caso le patiente esseva subjicite sin successo a tentativas de intubation durante un hora. Ille habeva recipite Meticorten duo dies ante le procedimento, con un dosage total de 30 mg. Post le operation, ille habeva nulle gravamines altere que un leve raucitate que durava plure dies.

6. Discoloration del histos esseva completemente absente in omne le casos tractate.

Medical Views on Oral Problems

DIAGNOSIS AND THERAPY OF CUSHING'S SYNDROME*

The authors discuss the histories of 10 patients (9 women and 1 man) with adrenal cortical hyperfunction (Cushing's syndrome) observed in the medical clinic of the University of Zurich before October, 1957. Autopsy reports were available in 2 of the cases, and in 7 patients, who had undergone adrenalectomy, the adrenals could be examined. An adenoma was found in the adrenals of 1 patient, whereas the adrenals in the other 8 patients showed hyperplasia. Although in one of these patients the hyperplasia was not detectable on naked-eye inspection, the histological examination in this and the other patients with hyperplasia revealed changes, such as adenoma-like sections in the cortex, obliteration of the cortical stratification, and cellular strands resembling fasciculated tissue. Studies on the hypophysis in the 2 autopsies revealed in one patient a basophil adenoma and in the other slight basophilism, in addition to metastases of a squamous-cell carcinoma. The excretion of hydrocortisone, ascertained on the basis of the 17-hydroxycorticoids, either was greatly increased or was in the upper limits of normalcy, but in 2 patients, in whom the aldosterone excretion was examined, reduced values were found, and one of these had hypopotassemia. The mineralocorticoids were not involved in the hypersecretion, the shifts in the electrolytes and the alkalosis being caused by the hydrocortisone.

An average of nearly 3 years elapsed between the appearance of the first symptoms and the correct diagnosis; in one patient the syndrome was recognized after 3 months. The most frequent of the clinical symptoms of Cushing's syndrome was a plethoric appearance with the characteristic moon-face; this was observed in all 10 patients. Hypogonadism was observed in 6 of the 10 patients: 5 of 8 women had amenorrhea or oligomenorrhea, and the man had impotence and azoospermia. Obesity, particularly of the trunk, was observed in only 4 patients. Hypertension occurred in 6 patients, but it was not severe. Osteoporosis was present in 7 patients and was severe in 2. Typical red striae existed in 4 patients, and 4 others had areas of superficial bleeding. Diabetes, as evidenced in reduced sugar tolerance, existed in 8 patients. Unusual features observed in this group of patients included: a sibship with polyadenomatosis (hyperparathyroidism, islet adenoma, etc.); the occurrence of adrenal hyperplasia secondary to an invasive pituitary adenoma composed of chromophobebasophilic-mucoid cells; and the association with bronchial carcinoma, with creatinuria and severe muscular dystrophy, with testicular atrophy, and with irreversible secondary adrenal insufficiency after operation on an active adrenal adenoma.

In addition to the cardinal symptoms, the diagnosis of Cushing's syndrome depends on the 48-hour intravenous corticotropin tolerance test with determination of the urinary steroids. Regarding the treatment, the authors say that no reliance can be placed on the rare occurrence of a spontaneous remission, the less so since untreated Cushing's syndrome is usually fatal within 5 years. Irradiation of the pituitary is sometimes effective, but the recurrence rate is high. Bilateral total adrenalectomy and subsequent substitution therapy are presently the treatment of choice of bilateral adrenal hyperplasia.

by A. Labbart, E. R. Froesch and W. Ziegler. Schweiz. med. Wchnschr. 89:44-53 (Jan. 10) 1959 (In German) [Basel, Switzerland].

* Medical Literature Abstracts, J.A.M.A., April 11, 1959, p. 1800-1.

HYPERSENSITIVE DENTIN*

TO THE EDITOR:—*About a year ago, information was obtained for the treatment of hypersensitive dentin. This included use of ammoniated silver nitrate, followed by 1 drop of eugenol and brushing the teeth with hot mineral oil, Andresen's paste, sodium silicofluoride, or Thermodent toothpaste. A sodium fluoride-kaolin-glycerin mixture and stannous fluoride were not recommended because they might cause degeneration of the dental pulp. Is any other treatment recommended?*

ANSWER.—All methods named have their enthusiastic proponents, but controlled clinical studies to support them are generally lacking. The sodium fluoride-kaolin-glycerin mixture has been adequately tested and shown to be an effective desensitizer. It can be used safely because damage to pulp results only when sodium fluoride is used in freshly cut cavities and, therefore, does not apply to desensitizing applications. Except for the fact that stannous fluoride and silver nitrate may stain teeth, they are perfectly safe. Desensitizing agents will not prevent recurrence of sensitivity if erosion is continuing and exposing fresh sensitive dentin. Treatment should include correction of factors causing erosion or gingival caries. Andersen's paste, which is a mixture of phosphates and other salts, for daily application, is supposed to do this, but the evidence is unconvincing.

* Questions and Answers, J.A.M.A., April 11, 1959, p. 1813.

INFECTIOUS HEPATITIS AND PREGNANCY*

TO THE EDITOR:—*Are pregnant women less susceptible to infectious hepatitis than the rest of the population? Is this disease more benign in pregnant as compared to nonpregnant women? If pregnant women are not less susceptible to infectious hepatitis, should they receive gamma globulin for their own protection and for the protection of the fetus?*

ANSWER.—There is no evidence that pregnant women are less susceptible to infectious hepatitis than the rest of the population. Pregnancy places a greater strain on the liver, and infectious hepatitis in pregnancy is more dangerous not only for the mother but also for the fetus. If pregnant women are exposed to infectious hepatitis, gamma globulin should be given for protection of both mother and fetus. An intramuscular injection of about 0.02 ml. per pound of body weight would be suitable.

* Question and Answers, J.A.M.A., April 11, 1959, p. 1812.

IDIOPATHIC HYPOGLYCEMIA*

TO THE EDITOR:—*Are there any ill-effects from a continued low-carbohydrate diet containing 100 to 150 Gm. of protein per day in a patient with idiopathic hypoglycemia? Would it be likely to cause an osteoarthritis or aggravate a pre-existing one?*

M.D., California.

ANSWER.—In a healthy person wide ranges in dietary composition are tolerated with no apparent ill-effects. A diet low in carbohydrate and with 150 Gm. of protein should not cause or aggravate osteoarthritis. The low-carbohydrate high-protein diet designed to render a steady support to blood sugar by gluconeogenesis, rather than sudden rises as with carbohydrate, has enjoyed a vogue in the treatment of functional hypoglycemia, but while this was an interesting concept, such treatment frequently failed. The most popular current concept is that functional hypoglycemia is a psychosomatic disorder and that it frequently responds to a sympathetic ear and reassurance. Osteoarthritis to date has been linked with trauma and the aging process. Its cause and pathogenesis are unknown. There is no evidence that it is related to carbohydrate metabolism or change in the diet. This statement does not apply to such forms of arthritis as gout.

* Questions and Answers, J.A.M.A., April 25, 1959, p. 2083.

ESTROGENS AND CLOTTING*

TO THE EDITOR:—*If estrogens are given intravenously to control hemorrhage by quickly increasing the concentration of prothrombin and accelerator globin, is it not reasonable to expect similar action, to a lesser degree, when they are taken orally? If this is so, would there not be a greater possibility of arterial occlusion, particularly coronary, among the rank and file of women who are taking estrogens?*

M.D., California.

ANSWER.—The changes observed in the blood components that promote coagulation accompany the intravenous injection of relatively large amounts of the conjugated estrogens. This rapid increase in the estrogens seems to be essential. The continued oral administration, with slower gastro-intestinal absorption, apparently does not have the same effect. Ancillary changes in capillary integrity, circulating lipids and other elements involved in coagulation accompanying estrogen administration possibly protect the vascular system from the increased coagulability of the blood. Such an "explanation" for the lack of vascular disease in women taking estrogens is at present without complete experimental foundation. It is, however, known that purified components of the conjugated estrogens do not give rise to the same changes in coagulation components or to as great a degree if change does occur.

* Questions and Answers, J.A.M.A., April 11, 1959, p. 1810.

Book Reviews

Practical Oral Surgery, by Henry B. Clark, Jr., M.D., D.D.S., Ed. 2, Lea & Febiger, Philadelphia, 509 illustrations, 469 pages, 1959, $9.50.

The author, a full time teacher of Oral Surgery with a combined medical and dental background, has written a book specifically for busy dentists and dental students with limited reading time. The text contains everything needed for the care of oral surgical conditions seen in daily practice.

In this second edition, new descriptive material has been added, especially in chapters on oral surgical technique, infections, injuries and deformities. The indications and technique for taking and performing biopsies are discussed. Antibiotic pre-medication for patients with valvular disease of the heart is explained and specific instructions for therapy are discussed. Proper management of patients receiving potent drugs, such as cortisone, ACTH, and dicumarol are outlined in respect to extraction of teeth and other oral surgery procedures. The necessary medical information is found throughout the text.

This book is ideal for review for National Board examinations and as a text for refresher courses in Oral Surgery. Glossaries of terms are given at the beginning of chapters on oral surgical diseases.

This practical text should be in the library of every practitioner of dentistry.

Conduction Infiltration and General Anesthesia in Dentistry, by Mendel Nevin, D.D.S., Marshall I. Nevin, M.D., F.C.C.P. and J. R. Bourgoyne, B.S., D.D.S., Dental Items of Interest Publishing Co., Inc., Brooklyn, N. Y., Ed. 6, 240 illustrations, 392 pages, $8.50.

This is the first posthumous edition of Dr. Mendel Nevin's book. The text has been entirely rewritten, revised and expanded to 392 pages. The newer material is in keeping with the latest findings on general anesthesia. The portion of the book on general anesthesia is not a revision, but an entirely new section written by Dr. J. R. Bourgoyne of the University of Tennessee.

The authors devote a chapter to the Birth of Anesthesia. They thoroughly discuss the important anatomical structures and landmarks which every dentist should know. The trigeminal nerve as related to dental surgery is fully discussed as is the blocking of the maxillary and mandibular nerves. Other topics of interest that are covered include extra oral injections, infiltration anesthesia, topical anesthesia, pharmacology of local anesthetic drugs, vaso-constrictors, syringes, needles and sterilization, premedication and post medication and the treatment of anesthetic reactions.

This book is well illustrated with clear pictures and drawings. The type is large and clear and the text is on glossy paper. This book is excellent reading for all.

Occlusal Equilibration and Temporomandibular Joint Dysfunction, by Nathan Allen Shore, D.D.S., J. B. Lippincott Co., Philadelphia, 242 illustrations, 323 pages, 1959, $12.50.

During the last two decades most of the problems of temporomandibular joint dysfunction have been receiving increasing attention from dentists as well as physicians. It is an accepted fact that discrepancies of the occlusion are one of the etiologic factors in temporomandibular joint problems. Doctor Shore has written a fine text specifically dealing with the many problems and sequellae associated with dysfunctions of the temporomandibular joint.

The author has coordinated many conflicting concepts of occlusal equilibration and temporomandibular joint dysfunctions and has presented his views so that the entire complex can be viewed as a complete diagnostic and therapeutic entity. Doctor Shore has made generous use of diagrams, figures and X-ray projections. His logical presentation of this material extends from theory and etiology through examination, diagnosis and practical procedure. A liberal bibliography follows each section and a full chapter of illustrative case histories completes the book.

This book is a welcome addition to the dental literature.

An Introduction to Periodontia, by Henry M. Goldman, D.M.D., F.A.C.D., Saul Schluger, D.D.S., D. Walter Cohen, D.D.S., Bernard Chaikin, D.M.D., F.A.C.D., and Lewis Fox, D.D.S., F.A.C.D., C. V. Mosby Co., St. Louis, 180 illustrations, 346 pages, 1959, $7.75.

Dr. Henry Goldman and his associates have written a "Primer" on Periodontia for the dental student and the general practitioner. This third of a series of three textbooks on Periodontia provides the basic background for one who is just becoming acquainted with the vast scope of fundamentals and therapeutcis of periodontia. This small volume in addition to the companion volumes entitled "Periodontia" and "Periodontal Therapy" probably compose the most extensive coverage of a dental subject since G. V. Black's four texts on operative dentistry. Dr. Goldman and his associates are to be congratulated on this new book.

The reader is exposed to a short discussion of the anatomy, histology and physiology of the periodontium. The authors discuss classification, etiology, the diseased gingival attachment, various lesions and ex-

amination, diagnosis, and radiographic interpretation. Therapy treatment planning and prognosis along with instrumentation and initial preparation are thoroughly covered. The authors treat at length the subject of therapy of the marginal lesions and therapy of the lesions of attachment apparatus. Dr. Goldman has also discussed the integration of restorative procedures in periodontal therapy. Oral physiotherapy and acute lesions are emphasized for the student and general practitioner.

This book is well written, clearly illustrated and is within the scope of the reader who is being introduced to the subject of periodontia. There is no doubt in the mind of this reviewer that once the student or practitioner has thoroughly read this small text, he will develop a growing interest in the field of periodontia. This book is a welcome addition to periodontal literature.

IRVING YUDKOFF

Open Door to Health, by Fred D. Miller, D.D.S., as told to Edna Yost, A. B., Litt. D. 179 pages, indexed, Devin-Adair Company, N. Y. C., 1959, $3.95.

Did you know that there is a dentist in Altoona, Pennsylvania, whose patients include hundreds of young people with caries free teeth, i.e., they have beautifully developed jaws and no fillings or cavities. This unique dentist is Dr. Frederick D. Miller. In 1912 while at the University of Pennsylvania Dental School he was deeply impressed by a statement made by Dr. Kirck, the dean. Dr. Kirck, the father of five children said: "Our children had fine teeth while living at home where we had control of their food habits, but soon after leaving home they all developed bad teeth." This thought planted a seed in Dr. Miller's mind which has been nourished over the subsequent years by observation and intensive study and has finally blossomed in the form of a remarkable book.

The dentist is in a unique position as far as patient education is concerned. In the first place he sees most of his patients regularly, secondly he has a splendid opportunity to detect early signs of degeneration and thirdly he has a "captive audience." This book will assist the dentist in his presentation and should be recommended reading for all patients interested in better health and subsequently better teeth and supporting tissues.

W. WARD TRACY

General Pathology and Bacteriology for Dental Students, by Ronald L. Bishton, M.D., John Wright & Sons, Ltd., Bristol, 1958, 317 pages, 112 illustrations, $8.50.

The author has based this book on the routine teaching given to dental students over a period of twelve years. The unusual arrangement of the chapters is designed to link pathology with bacteriology so they are not treated as separate subjects. Dr. Bishton discusses the many pathologic and bacteriologic problems from a dental point of view. The book is concerned with the etiology and pathogenesis of disease processes. The author stresses the point that the diagnosis, prognosis and sometimes treatment of a case are founded on the sound knowledge of the pathology of disease.

The author stresses one fundamental point, namely, "Nature is unpredictable and all pathological processes have their extremes in severity, the variations depending on the individual's personal response to the disease, and also on the intensity of the etiological factors."

This text is a fine reference book for the dental student.

Clinical Dental Hygiene, edited by Shailer Peterson, B.A., M.A., Ph.D. with 18 contributors, C. V. Mosby Co., St. Louis, 348 pages, 161 illustrations, 1959, $6.75.

This textbook was especially prepared for Dental Hygienists. It is the editor's belief that the dental hygiene profession should have books specifically written for their needs and they should not have to depend upon reference material written originally for other groups. Dr. Peterson and his contributors have prepared a book that will assist the dental hygiene student in acquiring much of the knowledge and skill that she will be expected to exhibit in the dental office and clinic.

"Clinical Dental Hygiene" includes topics which are of prime importance to the dental hygienist in her clinical practice. All of the contributors have had experience teaching dental hygiene students. This accounts for the excellent way in which the practical and theoretical aspects of dental hygiene have been integrated into this excellent text.

The Management of Oral Disease, by Joseph L. Bernier, D.D.S., M.S., F.D.S., R.C.S., (Eng.), ed.2, C. V. Mosby Co., St Louis, 875 pages, 1031 illustrations and 5 color plates, 1959, $15.00.

Dr. Bernier has written an excellent second edition of this already famous textbook on Oral Disease. Both the text and illustrations have been generously expanded with special attention to the Chapters on Dental Caries and Periodontal Disease. The author does not increasingly emphasize these conditions, but dwells in more detail on the pathology of these two subjects.

The author makes reference to pulpal changes related to high speed instrumentation since this has been a subject of investigation at the Armed Forces Institute of Pathology for the last few years. Dr. Bernier has received many requests for the techniques employed at the Institute for the preparation and sectioning of calcified tissues. This material has been included in the text.

Each of the twenty-two chapters that make up this fine book, is well written and illustrated. The black and white photographs are exceptionally clear and the color photography is a credit to the C. V. Mosby Co.

"The Management of Oral Disease" should be on the desk of every practitioner.

New Teeth for Old, by Victor H. Sears, D.D.S., ed. 3, C. V. Mosby Co., St. Louis, 108 pages, 1959, $3.00.

Ever since Paul Revere made dentures for George Washington, our first President and many millions of his countrymen, past, present and future, have worried about getting false teeth. Doctor Sears has written a handy book for the layman to acquaint them with the trials and tribulations of extractions, immediate dentures, bone resorption, etc. The author points out that there are more than 20 million denture wearers in the United States and a million and a half new sets of dentures are being inserted each year. He also points out that more than half of us reach the denture wearing age in our fifties.

When the time comes to consider artifical dentures the average patient has many questions which he will find answered in the pages of this book. This information will help to relieve many of the patient's anxieties about what is ahead for him.

NEW YORK SECTION

The New York Section has just concluded one of its most productive years. Three excellent speakers lectured to the group on very pertinent material. Dr. Austin H. Kutscher spoke on "The Use of Antibiotics in the Dental Office," Dr. LeRoy M. Ennis on "Current Concepts of Radiation,', and Dr. Irving Glickman on "What the Gingivectomy Does For the Gingiva."

The new program chairman has already started on plans for another interesting year. There will be lectures on "Simple Orthodontic Procedures For the General Practitioner" by Dr. Lewis Schwartz in October and on "Restorative Dentistry With Relation to Periodontics" by Dr. Milton Hollins in February. A third and equally interesting lecture to be given in May will be announced at a later date.

The newly elected officers of the New York Section for the coming year are:

President	Howard L. Ward
President-Elect	Henry I. Greene
Secretary	Angelo Cacciatore
Treasurer	Seymour Koteen
Editor	Leonard M. Nevins

LEONARD M. NEVINS, *Section Editor*

Academy Proceedings

NEW JERSEY SECTION

The New Jersey Section of the American Academy of Dental Medicine closed its 1958-1959 season by acting as hosts at the annual 1959 meeting of the Academy in Atlantic City May 14-17, 1959.

Three regular meetings followed by a scientific session were held at the Hotel Douglas, Newark, New Jersey. On October 28, 1958, Dr. George Witkin, Assistant Professor in the Department of Periodontia and Oral Medicine, New York University College of Dentistry, spoke on "The Appreciation of Oral Lesions." Dr. John Manhold, Jr., Professor and Director, Department of Oral Diagnosis and Pathology, Seton Hall College of Medicine and Dentistry, was the essayist at our mid-winter meeting, January 13, 1959. His topic was "The Psychological Aspects of Oral Diagnosis." Our spring meeting was held on April 14, 1959. The essayist for the evening was Vincent D'Agati, M.D., Assistant Professor of Medicine, Fairleigh Dickinson University School of Dentistry. He spoke on "The Dental Management of the Cardiac Patient."

The following new officers were elected:

President—Abram I. Chasens
President-Elect—Samuel A. Ament
Secretary-Treasurer—James B. Dickinson
Editor—Louis B. Kelsten
National Delegate—Ruben Feltman

Trustees: Edward Bressman, Jack M. Eskow, and Walter Soltanoff.

NEW MEMBERS ELECTED AT THIRTEENTH ANNUAL MEETING OF AMERICAN ACADEMY OF DENTAL MEDICINE—MAY 16, 1959

Auerbach, Gabriel I.
Springfield, Mass.

Conrad, Sidney C.
Laurelton, N. Y.

Couture, Jean P.
Verdun, Canada

Dean, Martin L.
Newark, N. J.

Dyen, David I.
Norristown, Pa.

Fiore, James A.
Roslindale, Mass.

Fischer, Ferdearle J.
Trenton, N. J.

Fishbein, Arthur I.
Levittown, Pa.

Gelb, Harold
New York, N. Y.

Giammattei, Alejandro C.
Guatemala City, Guatemala

Goldberg, Leon S.
Buffalo, N. Y.

Greenfield, Lawrence
Brewster, N. Y.

Jarvis, Edward C.
Merion Station, Pa.

Jasper, Milton H.
St. Louis, Mo.

Kim, Nhak Hee
Seoul, Korea

Loiselle, Raymond J.
Memphis, Tenn.

Lucas, John J.
Hershey, Pa.

Martin, Capt. Niels H.
Brooklyn, N. Y.

Meister, Malcolm
Jamaica, N. Y.

Mezl, Zdenek
Montreal, Canada

Miller, Harvey
Wappingers Falls, N. Y.

Okun, Stanley I.
New York, N. Y.

Rappaport, Harold M.
Camden, N. J.

Rosen, Gerald
New York, N. Y.

Sanders, Capt. William E.
Newport, R. I.

Schilder, Herbert
Boston, Mass.

Skurnik, Harry
Montreal, Canada

Smithloff, Milton
Atlanta, Ga.

Stanhope, Stuart C.
St. Louis, Mo.

Stine, John H.
Bryn Mawr, Pa.

Stoner, Carl
New London, Conn.

Towns, Clarence, Jr.
Chicago, Ill.

Walker, William J.
Chicago, Ill.

Zase, Selig
Randolph, Mass.

AMERICAN ACADEMY OF DENTAL MEDICINE

Bermuda • May 1961

Annual Meeting and Vacation Cruise

6 GLORIOUS DAYS AND NIGHTS

BEAUTIFUL OCEAN CRUISE plus

3 DAYS ON THE TROPICAL ISLAND OF BERMUDA

Entertainment — Dancing

Swimming Pool — Sightseeing — Coral Beaches

Smart Shops — Duty Free Purchases

OUTSTANDING LECTURERS AND CLINICIANS in a CONDENSED POST-GRADUATE COURSE IN DENTAL MEDICINE

TOTAL COST — about $175

PLEASE CUT ALONG THIS LINE

Dear Member —

To help in planning this Annual Meeting and Cruise, please answer the following questions immediately and return no later than August 15, 1959 to the undersigned.

I approve this Meeting ☐

I do not approve ☐

I will attend ☐ with ..... guests

Comments.....

.....

.....

.....

Return to

Dr. George F. Clarke
554 Franklin Street
Melrose 76, Mass.
National Convention Chairman

Announcements

POSTGRADUATE TRAINING IN PERIODONTIA AND ORAL MEDICINE NEW YORK UNIVERSITY COLLEGE OF DENTISTRY

The following postgraduate courses in Periodontia and Oral Medicine will be offered at the New York University College of Dentistry and will be given by Dr. Sidney Sorrin and associates:

No. 124.02. REFRESHER COURSE IN PERIODONTIA AND ORAL MEDICINE

Ten sessions, Wednesday, 4:00 to 6:00 P.M. February 3, 1960 to April 6, 1960.
Tutition and books. $156.00. Instruments approximately $55.00.

Theoretical and practical application of periodontal diagnosis and techniques to general dentistry. Four lecture and six clinical demonstration sessions. Equilibration of occulsion is performed by the student on casts. Patient demonstrations include equilibration of occulsion, conservative and radical therapy, home care, etc.

No. 123.02. PERIODONTIA AND ORAL MEDICINE IN THE SPANISH LANGUAGE

Four weeks, Monday through Friday, 9:00 A.M. to 4:00 P.M.
March 7 to April 1, 1960 inclusive. Tuition including books and instruments approximately $385.00.

Theoretical and practical application of Periodontia and Oral Medicine is fully explained and demonstrated. Equilibration of occlusion is performed by the student on casts. Lectures and clinical demonstrations of diagnosis and treatment planning, conservative and radical techniques, equilibration of occlusion, home care, etc. The entire course is conducted in the Spanish language.

COMPREHENSIVE PREPARATION IN PERIODONTIA AND ORAL MEDICINE

No. 121.11 One academic year, full time. September 14, 1959 to May 27, 1960.
Tuition $1,010.00. Instruments and books approximately $135.00.

No. 120.11 and 121.11. Two academic years, full time. September 14, 1959 to May 26, 1961.
Tuition $2,020.00 (two years). Instruments and books approximately $231.00.

No. 121.21. Two academic years, half time. September 14, 1959 to May 26, 1961. (Two and one half days weekly.)
Tuition $1,010.00 (two years). Instruments and books approximately $135.00.

No. 120.21 & 121.21 Four academic years, half time. September 14, 1959, to May 1963. (Two and one half days weekly.)
Tuition $2,020.00 (four years). Instruments and books approximately $231.00.

These courses are designed for comprehensive preparation in Periodontia and Oral Medicine and are of particular significance for certification towards specialization. All didactic and clinical phases are covered with the objective of developing expert proficiency.

No. 222. GRADUATE COURSE IN PERIODONTIA AND ORAL MEDICINE.

Two academic years, full or half time, beginning Sept. 14, 1959. Tuition $2,020.00. (two years). Instruments and books approximately $275.00.

This program leads to the degree of Master of Science (in Dentistry). The objectives are to teach superior proficiency in Periodontia and Oral Medicine based on adequate background in the basic sciences.

For further information, write to the Secretary, Postgraduate Studies, New York University College of Dentistry, 421 First Ave., New York, N. Y.

THE AMERICAN BOARD OF ORAL PATHOLOGY

The next examination for certification will be held on December 5-6, 1959. Applications must be completed by July 1 in order to qualify for the December examination. The place will be announced when the geographical distribution of candidates has been determined. Application should be made to Dr. Donald A. Kerr, Secretary-Treasurer, The University of Michigan School of Dentistry, Ann Arbor, Michigan.

METROPOLITAN CONFERENCE OF HOSPITAL DENTAL CHIEFS

All dentists on hospital staffs are cordially invited to attend a special meeting of the Metropolitan Conference of Hospital Dental Chiefs to be held during the Centennial session of the American Dental Association. The meeting will take place on Monday, September 14, 1959 from 3:30 P.M. to 5:30 P.M. in the Regina Coeli Hall of St. Clare's Hospital, 427 West 52 Street, New York City.

Outstanding dentists have been scheduled to speak on "Progress in Hospital Dentistry thru Regional Organizations."

Further particulars may be obtained from Dr. I. E. Gruber, Chairman, Special Meeting Committee, 12 Harmon Street, Brooklyn 21, New York.

FEDERATION DENTAIRE INTERNATIONALE

The Federation Dentaire Internationale is a Federation of approximately 50 national dental associations. The American Dental Association is the largest single section.

Supporting Members. Individual members of such national associations may become supporting members of the F.D.I. All members of the American Dental Association desiring such membership are requested to contact the National Treasurer for the U.S.A.

Dues. The annual dues for F.D.I. supporting membership for 1959 are $15.00. By returning to the National Treasurer the application blank together with your remittance for the 1959 dues, you will become a member of the Federation and be listed to receive all publications of the F.D.I.

Membership Includes:

1. F.D.I. membership card
2. Certificate of Membership, suitable for framing.
3. Subscription to the International Dental Journal (Quarterly).
4. Subscription to the F.D.I. News Letter (Quarterly).
5. Recognition on registration fee at any annual meeting or quinquennial congress of the Federation.
6. Annual publication of list of F.D.I. members in all countries through the International Dental Journal.
7. Assistance of F.D.I. Travel Consultant, Dr. C. W. Carrick, Oberlin Bank Building, Oberlin, Ohio, in planning your attendance at foreign dental meetings.

Annual Meeting. The 1959 annual meeting of the F.D.I. will be held in New York City, September 12-19 in conjunction with the 100th Anniversary meeting of the American Dental Association. This affords you a fine opportunity of attending an annual meeting of the Federation Dentaire Internationale.

For further information please contact: DR. O. H. MOEN, F.D.I. National Treasurer (United States), 6 Main Street, Watertown, Wisconsin.

Application for Membership

FEDERATION DENTAIRE INTERNATIONALE

I wish to become a supporting Member of the Federation Dentaire Internationale and subscribe to the International Dental Journal.

Name .....
(Please print)

Degrees .....

Address .....
(Please print)

I am a Member of the American Dental Association.

I enclose $15.00 for Supporting Membership and subscription to the International Dental Journal for the year.....

Please complete and return with your remittance to

DR. OBED H. MOEN
U. S. National Treasurer
6 Main Street, Watertown, Wisconsin, U. S. A.

ST. APALLONIA GUILD

In conjunction with the Centennial Meeting of the American Dental Association:

Annual communion breakfast sponsored by:
St. Apallonia Guild
Catholic Dentist Guild of Brooklyn
Catholic Dentist Guild of Rockville Centre

Date:—Sunday, Sept. 13, 1959.

Mass:—St. Patrick's Cathedral 9 a.m. Mass.

Breakfast:—Waldorf-Astoria Hotel, 10:30 a.m. following mass.

Speaker:—Rev. Robert I. Gannon S.J.

Price:—Six ($6.00) dollars per person—Ladies and children invited.

Reservation:—Reservations with check, please, to:
Dr. Paul Bruel, 2 East 69th Street New York City, N. Y.

TEMPLE UNIVERSITY SCHOOL OF DENTISTRY

Temple University announces a two-weeks course in Advanced Orthodontics beginning January 17, 1960, under the direction of Dr. Robert H. W. Strang.

The course is given to practicing Orthodontists only. The cost is $300.00 exclusive of instruments and books.

For application and information, apply to:
Dr. Louis Herman, Director of Postgraduate Studies, Temple University School of Dentistry, 3223 North Broad Street, Philadelphia 40, Pennsylvania.

NORTHEASTERN SOCIETY OF PERIODONTISTS

The new officers of the Northeastern Society of Periodontists are:

President	Harold J. Leonard
President-elect	George J. Witkin
Secretary	Irwin W. Scopp
Treasurer	George J. Whinston
Editor	Norman E. Alderman
Chairman, Committee on Membership	Charles L. Berman
Chairman, Committee on Education and Publicity	Anthony F. Posteraro

Plans are under way for a fall seminar in Periodontology.

AMERICAN ACADEMY OF PERIODONTOLOGY

The American Academy of Periodontology will hold its Annual Meeting at the Barbizon Plaza Hotel, 106 Central Park South, New York City, on September 10th, 11th and 12th, 1959.

This year's meeting will score a first in the presentation of clinical material, inasmuch as clinics will be presented from the Walter Reed Army Medical Center, and the Armed Forces Institute of Pathology in Washington, D. C. These clinics will be presented by means of closed circuit colored telecasts with wide screen projection in the Barbizon Plaza Hotel, New York City.

Participation in this meeting is open to all members of the American Dental Association upon the payment of a modest registration fee.

Howard A. Hartman, D.D.S.
Chairman Publicity Committee,
American Academy of Periodontology

AMERICAN ACADEMY OF ORAL PATHOLOGY

At the 13th Annual Meeting of the American Academy of Oral Pathology held April 17-19, 1959 at the Mayo Auditorium, University of Minnesota, the following slate of officers was elected:

President	Col. Joseph Bernier
President-Elect	Capt. Robert Colby
Vice President	Cmdr. Henry Scofield
Secretary-Treasurer	Dr. Robert J. Gorlin
Editor	Dr. Donald Kerr
Council	Dr. Victor Halperin
	Dr. Nelson Large
	Dr. Irving Meyer
	Dr. Hamilton B. G. Robinson
	Dr. William Shafer
	Dr. Richard Tiecke

American Board of Oral Pathology Examiner—Dr. Charles Waldron.

AMERICAN DENTAL SOCIETY OF ANESTHESIOLOGY

The American Dental Society of Anesthesiology will hold its sixth annual meeting at the Hotel Plaza in New York City on September 12 and 13, 1959, just prior to the start of the Centennial Convention of the American Dental Association.

The General Chairman of the meeting is Dr. Harry M. Seldin. He is assisted by Drs. Morris Fierstein, William Rakower, and I. Lawrence Kerr.

Registration for the meeting begins on Friday, September 11, at 4 p.m. The registration desk will also be open on Saturday, September 12 at 8:30 a.m.

A wide variety of subjects relating to anesthesiology in dentistry will be included in the program, and many well known personalities in the field of anesthesiology will participate.

There will be a luncheon with anesthesia personalities on Saturday, a banquet-lunch on Sunday, and a dinner-dance and cocktail party Sunday evening.

Members of the A.D.S.A. are urged to write in for reservations for these occasions early. Send your requests to Dr. William Rakower, 57 West 57th Street, New York 19, New York.

TEMPLE UNIVERSITY SCHOOL OF DENTISTRY

CLINICAL ENDODONTICS

By Leonard Parris, D.D.S., Herbert Schilder, D.D.S., and Associates; October 26, 27, 28, 29, 30, 31, 1959; 9 A.M. to 5 P.M.

An Intensive Participation Course

The objective of this course is to train the dentist in clinical endodontic procedures. Sufficient material of a basic biologic nature will be presented to insure a proper understanding and approach to the clinical phase.

The course will be given on six consecutive days, and will consist of lectures, supplemented by slides and clinical demonstrations. The postgraduate student will utilize diagnostic procedures, initiate treatment, and carry through to completion endodontic therapy on clinic patients. Single and multi-rooted teeth will be treated.

Tuition: $175.00 Enrollment limit: 10

For further information and application, write to: Postgraduate Division, Temple University School of Dentistry, 3223 North Broad Street, Philadelphia 40, Pennsylvania.

THE NEW YORK INSTITUTE OF CLINICAL ORAL PATHOLOGY

The New York Institute of Clinical Oral Pathology announces the Eighth Herman L. Reiss Memorial Lecture to be held at the New York Academy of Medicine Building, 2 East 103rd Street, on Monday, October 26, 1959, at 8:30 P.M.

The essayist will be James R. Cameron, D.D.S., Sc.D., LL.D., F.A.C.D., F.I.C.A., Professor of Oral Surgery, Graduate School of Medicine, University of Pennsylvania; Professor of Oral Surgery, Temple University School of Dentistry, Philadelphia, Pa., who will lecture on the subject of "Oral Surgery at the Crossroads—Which Direction?"

This will be an open meeting to which members of the dental, medical and allied professions are cordially invited.

AMERICAN SOCIETY OF DENTISTRY FOR CHILDREN

The full range of pedodontics will be covered at the 32nd anniversary meeting of the American Society of Dentistry for Children to be held at Hotel Commodore, New York City, September 11 to 13, it has been announced by Dr. M. Joel Freedman, General Chairman.

More than two thousand members and guests from all parts of the world are expected at the meeting, which will immediately precede the Centennial Session of the American Dental Association.

Guests of honor will include numerous dignitaries from the health professions and public life, including Dr. Percy T. Phillips, A.D.A. president, and Dr. Leona Baumgartner, Health Commissioner of New York City who is President of the American Public Health Association.

The scientific program will stress the latest techniques for treatment of the whole child. Leading specialists and educators will be featured in registered clinics, table clinics, essays, demonstrations, and special dicussions.

With the registered clinics filling up rapidly, it is advised that reservations be made as early as possible.

All society members as well as other interested dentists are cordially invited to attend. Programs and reservations are available through Dr. Freedman at 300 East 23 Street, New York 11, N. Y.

TUFTS UNIVERSITY SCHOOL OF DENTAL MEDICINE

Tufts University School of Dental Medicine announces the following Postgraduate Refresher Courses:

DPG. 908—A SPECIAL PARTICIPATION COURSE IN FULL DENTURE PROSTHESIS

Monday through Friday for One Week from September 21 through September 25, 1959
Tuition $200.00—Class Limited

Dr. Philip Williams, Professor of Graduate and Postgraduate Studies and Staff

The course will be presented in English but assistance will be available in Spanish, Italian, French, German and Greek by competent members of the Staff.

DPG. 908—COSMETIC VARIATIONS IN JACKET CROWN AND BRIDGE RESTORATIONS INVOLVING PERIODONTAL LESIONS

Monday and Tuesday
September 21, 22, 1959
Tuition $60.00—Class Limited

Dr. Charles L. Pincus, D.D.S.,
Beverly Hills, California

For further information and application write to: Director of Graduate and Postgraduate Studies, Tufts University School of Dental Medicine, 136 Harrison Avenue, Boston, Massachusetts.